



September 2016

JOINT INTELLIGENCE ANALYSIS COMPLEX

DOD Partially Used
Best Practices for
Analyzing Alternatives
and Should Do So
Fully for Future
Military Construction
Decisions

Why GAO Did This Study

DOD's JIAC, currently located at RAF Molesworth in the United Kingdom, provides critical intelligence support for the U.S. European and Africa Commands and U.S. allies.

GAO was asked to review DOD's decision to consolidate and relocate the JIAC to RAF Croughton, United Kingdom. This report 1) describes key considerations that influenced DOD's decision and 2) evaluates the extent to which DOD's AOA process for its JIAC consolidation project aligns with best practices for such analyses.

GAO visited current JIAC facilities to observe their condition and discuss with officials how certain factors affect the JIAC's ability to effectively conduct its mission, and the base at which DOD plans to consolidate the JIAC. GAO also discussed this AOA process with officials who participated in, and are knowledgeable about, the process; reviewed documentation used by DOD during the process; and evaluated the information using best practices identified by GAO as necessary characteristics of a high quality, reliable AOA process.

What GAO Recommends

GAO recommends that DOD develop guidance that requires the use of best practices—including those identified by GAO—when conducting AOA processes for certain future military construction projects. DOD did not agree, stating that the best practices do not apply to military construction project decision-making processes. GAO continues to believe that its recommendation is valid, as discussed in this report.

View [GAO-16-853](#). For more information, contact Brian J. Lepore at (202) 512-4523 or leporeb@gao.gov.

JOINT INTELLIGENCE ANALYSIS COMPLEX

DOD Partially Used Best Practices for Analyzing Alternatives and Should Do So Fully for Future Military Construction Decisions

What GAO Found

The Department of Defense's (DOD) decision to consolidate and relocate its Joint Intelligence Analysis Complex (JIAC) to Royal Air Force (RAF) base Croughton in the United Kingdom (U.K.) was influenced by the JIAC's current facilities' deteriorating condition and DOD criteria that guided its analysis of alternatives (AOA). DOD determined the current facilities are not well suited to the JIAC's mission, in poor condition, and uneconomical to upgrade. In light of this, DOD's AOA process was driven by five criteria. Two of these—impact on intelligence operations and impact on bilateral and multinational intelligence collaboration—were considered critical, and three others—impact on international agreements and relationships, impact on community quality of life, and the business case for consolidation—important but secondary.

DOD's AOA process for JIAC consolidation fully or substantially met 6 best practices, partially or minimally met 15, and did not meet 1. Thus, it partially met the four characteristics encompassing these practices that GAO has identified as necessary to produce a high quality, reliable AOA process:

- *Well documented:* DOD's AOA process partially met the best practice of tying benefits or effectiveness to mission need, with a general explanation of how mission needs will be met under DOD's five AOA criteria. However, DOD minimally met the best practice of documenting the AOA process in a single document.
- *Comprehensive:* DOD's AOA process fully met the best practice of defining mission need, but minimally met the best practice of developing life cycle cost estimates. Specifically, DOD officials characterized the level of detail for its 2011 preliminary estimates as "extremely rough."
- *Unbiased:* DOD's AOA process substantially met the best practice of ensuring that the process was impartial, in part because an independent DOD organization reviewed its conclusions. In contrast, DOD minimally met the best practice of comparing alternatives, as it did not provide evidence that all alternatives were evaluated against the same data.
- *Credible:* DOD's AOA process fully met the best practice of defining criteria, but minimally met the best practice of describing alternatives. Specifically, DOD's AOA body of work does not provide sufficient detail on each alternative to allow for robust analysis.

According to DOD officials, the department did not follow best practices when conducting its JIAC consolidation AOA process. This is because DOD does not have guidance outlining a set of AOA best practices for military construction decisions. Without guidance for using AOA best practices during certain military construction projects—such as those above a certain monetary threshold—DOD and Congress may face oversight challenges, and DOD may have trouble justifying its decisions for military construction projects in the future.

This is a public version of a classified report that GAO issued previously. It excludes classified information that provided additional detail on DOD's decision to consolidate the JIAC at RAF Croughton.

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Abbreviations

AFRICOM	U.S. Africa Command
AOA	analysis of alternatives
DOD	Department of Defense
EUCOM	U.S. European Command
JIAC	Joint Intelligence Analysis Complex
NATO	North Atlantic Treaty Organization
RAF	Royal Air Force

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September 30, 2016

Congressional Requesters

According to the Department of Defense (DOD), its Joint Intelligence Analysis Complex (JIAC) is critical to providing intelligence support for the U.S. European and Africa Commands (EUCOM and AFRICOM) and U.S. allies. DOD has stated that the JIAC's 21 current facilities—located at Royal Air Force (RAF) base Molesworth in the United Kingdom—are inadequate, inefficient, and were not designed to support the JIAC's intelligence missions, leading to costly sustainment challenges and instances of degraded theater intelligence capabilities. These include, according to the Air Force, numerous facility-related information technology system outages that have severely degraded theater command and control and intelligence capabilities for several hours at a time. To address these issues, the Air Force plans to spend almost \$240 million for a military construction project that will consolidate and relocate the current JIAC's facilities in order to provide additional space—designed to support the JIAC—that fully enables current intelligence missions.¹

According to DOD, in the fall of 2009, DOD began its analysis of alternatives (AOA) process for consolidation of the JIAC, considering as potential alternatives locations in Europe and the United States. By the spring of 2013, DOD had concluded that its preferred alternative was to move the JIAC from its current location at RAF Molesworth and consolidate the JIAC's facilities at RAF Croughton, both of which are located in the United Kingdom. To do so, the Air Force initiated a three-phase military construction project that the service plans to complete by the fall of 2020.² In addition, consolidation of the JIAC at RAF Croughton

¹ JIAC officials stated that, in addition to the cost of these Air Force-funded facilities, DOD plans to commit additional funding to other supporting facilities and infrastructure. The officials also explained that there will be additional non-facility costs such as the base operations support needed to accommodate the increased logistical requirements that the JIAC and its personnel will place on RAF Croughton's infrastructure. In addition—as discussed later in the report—DOD officials explained that the department also plans to save money by closing two installations in the course of consolidating the JIAC at RAF Croughton.

² Because of DOD's decision to move the JIAC to RAF Croughton, the department plans to close both RAF Molesworth and RAF Alconbury, a support installation.

is one of 26 initiatives that DOD has decided to carry out as part of the department's European Infrastructure Consolidation effort. In January 2015 the department announced this effort with the objective to—among other things—eliminate existing, unneeded facilities to create long-term savings, realign existing infrastructure in order to create excess that can be eliminated, and validate remaining infrastructure for sustaining the United States' enduring presence in Europe.

From 2013 to 2016, Congress has required DOD to provide information on its JIAC consolidation effort, and since 2013, has taken a number of oversight actions in the form of statutory requirements and committee direction. For example, House Report 113-102 directed DOD to provide detailed information on the department's plans for JIAC consolidation at RAF Croughton.³ In other, statutory provisions, Congress prohibited DOD from obligating or expending military construction funds in the United Kingdom or awarding construction contracts in the European Command area of responsibility until DOD provides required information.⁴ In the National Defense Authorization Act for Fiscal Year 2016, Congress authorized funding for the JIAC consolidation but prohibited the expenditure of funds until the Secretary of Defense certifies to the defense committees and explains why RAF Croughton remains the "optimal location" for the recapitalization of the JIAC.⁵ DOD has provided the required information in response to committee direction and statutory provisions.⁶

In the JIAC's Phase 1—according to Air Force budget documentation—the Air Force plans to build EUCOM's Intelligence Analytic Center, a data processing center, a warehouse, and various supporting facilities. This documentation also explains that Phase 2 would consist of AFRICOM's Intelligence Analytic Center, the North Atlantic Treaty Organization

³See H.R. Rep. No. 113-102, at 218 (2013).

⁴See, for example, the National Defense Authorization Act for Fiscal Year 2014, Pub. L. No. 113-66, § 2809 (2013) and the Military Construction and Veterans Affairs, and Related Agencies Appropriations Act, 2014, Pub. L. No. 113-76, Div. J, Title I (2014).

⁵See Pub. L. No. 114-92, § 2310 (2015).

⁶In response to the House Report 113-102 requirement, DOD provided information in August and December 2013. In response to the requirement in the National Defense Authorization Act for Fiscal Year 2016, DOD provided its certification in March 2016.

(NATO) Intelligence Fusion Center, a battlefield information system, and additional supporting facilities. Phase 3 includes, according to this documentation, a regional Joint Intelligence Training Facility and a physical fitness facility.⁷ In December 2014 and November 2015, the Congress appropriated \$92.2 million and \$94.2 million for construction Phases 1 and 2, respectively.⁸ In August 2015, DOD obligated Phase 1 funding to the United Kingdom, which is serving as the executive agent for JIAC construction. In July 2016, DOD obligated Phase 2 funding to the United Kingdom. As of September 2016, DOD officials said they anticipate awarding a contract for Phases 1 and 2 in mid- 2017 with construction to start in the fall of 2017. Appendix I provides a timeline of key events for JIAC Consolidation at RAF Croughton.

In separate requests, we were asked to evaluate DOD's process for analyzing alternatives for potential JIAC locations and to evaluate DOD's process for estimating costs for the JIAC consolidation military construction project at RAF Croughton. In response, this report 1) describes key considerations that influenced DOD's decision to consolidate the JIAC at RAF Croughton and 2) evaluates the extent to which DOD's analysis of alternatives process for its JIAC consolidation project aligns with best practices for such analyses. In a separate review, we are evaluating the extent to which DOD's cost estimation guidance used for the cost estimate of JIAC consolidation at RAF Croughton aligns with best practices, how the department has assessed other locations in Europe for consolidation of the JIAC, and other related issues. We plan on completing this review later in 2016.

To conduct our work, we assessed information from various DOD organizations, including U.S. Air Force Headquarters, the Basing Directorate of the Office of the Secretary of Defense, and the headquarters of both EUCOM and AFRICOM. In addition, we visited various components of the JIAC at RAF Molesworth, the JIAC's support facilities located at RAF Alconbury, and the planned future JIAC site at RAF Croughton.

⁷Later in this report, we provide more information on these organizations.

⁸DOD's estimate for Phase 3 is \$53.1 million, bringing the total estimated cost for the JIAC consolidation military construction project at RAF Croughton to about \$240 million.

To describe the considerations that influenced DOD's decision to consolidate the JIAC at RAF Croughton, we reviewed various DOD documents describing the condition of the JIAC's current facilities, including Air Force budget justification documents submitted to the Congress for the JIAC consolidation military construction projects. During our site visit to the various components of the JIAC at RAF Molesworth and its support facilities located at RAF Alconbury, we met with JIAC officials to learn about the facilities' condition, discussing—among other things—how their deteriorating condition causes fiscal and operational impacts. In order to describe the five criteria DOD applied in its decision to consolidate the JIAC at RAF Croughton—and key issues related to those criteria—we reviewed DOD documentation from its AOA process, such as a 2011 preliminary AOA summary of the process; interviewed officials from DOD's AOA team; and reviewed additional, related documents, such as Air Force guidance, that address requirements for the use of temporary facilities.⁹

To determine the extent to which DOD's analysis of alternatives process for its JIAC consolidation project aligns with best practices for such analyses, we reviewed all data and documentation developed by DOD as a part of its AOA process from the initial concept proposal of JIAC consolidation in the fall of 2009 to the Resource Management Decision for JIAC consolidation, issued by the Secretary of Defense in April 2013. We refer to this collection of information (produced from the fall of 2009 to the spring of 2013) as DOD's "AOA body of work." In this study, we cite key documents from DOD's body of work with abbreviated titles. For example, in the fall of 2011, EUCOM produced a preliminary summary of DOD's AOA efforts—up to that point in the process—named Analysis of Alternatives (AOA) for Recapitalization of Intelligence Facilities at RAF Molesworth. We refer to this document as the "2011 preliminary AOA summary." In addition, we discussed DOD's AOA process for JIAC consolidation with officials from organizations in the AOA team and at the current JIAC. After collecting available data and documentation from DOD, we evaluated DOD's AOA body of work against GAO's 22 AOA

⁹Air Force Instruction 32-1032, *Planning and Programming Appropriated Fund Maintenance, Repair, and Construction Projects*, (Sep. 24, 2015).

best practices.¹⁰ We then scored DOD's AOA body of work against each best practice.¹¹ The team used the average of the scores for each of the individual best practices to determine an overall score for the four summary characteristics for a high-quality reliable AOA process— well-documented, comprehensive, unbiased, and credible.¹² Next we shared our draft analysis with DOD, asking that the department provide technical comments and any additional documentation that might impact our assessment. We then incorporated these additional comments to ensure our analysis included all available information. Finally, we applied the same methodology and scoring process explained above to revise our initial analysis based on DOD's technical comments and any additional evidence received. For those characteristics of the AOA process that received a lower-than-average score, we met with DOD officials to discuss potential reasons why they did not conform to best practices for those parts of the AOA process. In the course of applying our AOA best practices to information in DOD's AOA body of work, we assessed the reasonableness of the information we collected. Examining DOD's AOA process for JIAC consolidation with our AOA best practices allowed us to

¹⁰These best practices were originally published in GAO, *Amphibious Combat Vehicle: Some Acquisition Activities Demonstrate Best Practices; Attainment of Amphibious Capability to Be Determined*, [GAO-16-22](#), (Washington, D.C.: Oct. 28, 2015) and are based on previously published best practices. To evaluate DOD's AOA process, we took the following steps: (1) two GAO analysts separately examined the AOA information received from DOD, providing a score for each of the 22 best practices; (2) a third GAO analyst adjudicated any differences between the two analysts' initial scoring; (3) a GAO specialist on AOA best practices, independent of the audit team, reviewed the team's adjudicated AOA documentation and scores, cross-checking the scores and all of the analyses for consistency. The best practices' applicability to DOD's military construction process is discussed in more detail below.

¹¹GAO's best practices define five different qualitative and quantitative categories for scoring. The qualitative categories are as follows. Fully Meets: DOD provided complete evidence that satisfies the elements of the best practice; Substantially Meets: DOD provided evidence that satisfies a large portion of the elements of the best practice; Partially Meets: DOD provided evidence that satisfies about half of the elements of the best practice; Minimally Meets: DOD provided evidence that satisfies a small portion of the elements of the best practice; and Does Not Meet: DOD provided no evidence that satisfies any of the elements of the best practice. The corresponding quantitative categories are as follows. Not Met = 1, Minimally Met = 2, Partially Met = 3, Substantially Met = 4, and Fully Met = 5.

¹²The resulting average score, for each characteristic, corresponds to one of the five qualitative categories, as follows: Not Met = 1.0 to 1.4, Minimally Met = 1.5 to 2.4, Partially Met = 2.5 to 3.4, Substantially Met = 3.5 to 4.4, and Fully Met = 4.5 to 5.0.

assess the strengths and weaknesses of the department's process. Our best practices were not used to determine whether DOD made the correct decision on the location for JIAC consolidation or whether the department would have arrived at a different conclusion had it more fully conformed to our best practices. Rather, we used our best practices to assess the degree to which DOD can provide reasonable assurance that its process met each of the four characteristics of a high-quality, reliable AOA process. Finally, we applied the same methodology and scoring process explained above to revise our initial analysis based on DOD's technical comments and any additional evidence received. We determined that the information from DOD's AOA body of work is sufficiently reliable for the purposes of describing DOD's rationale for choosing RAF Croughton as the location for JIAC consolidation and comparing DOD's AOA process to our 22 best practices for a reliable AOA process. More information on the scope and methodology of our research is provided in appendix II, further details on GAO's 22 AOA best practices can be found in appendix III, and we provide a summary of our analysis of DOD's AOA process for JIAC consolidation—according to the 22 best practices—in appendix IV.

We conducted this performance audit from October 2015 to September 2016, in accordance with generally accepted government auditing standards. These standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

This report is a public version of a classified report (GAO-16-563C) issued in July 2016. DOD deemed some of the information in the classified report Secret Not Releasable to Foreign Nationals (SECRET//NOFORN) and Confidential. Therefore, this report excludes classified information that provided additional detail on DOD's decision to consolidate the JIAC at RAF Croughton. Although the information provided in this public report is more limited, it addresses the same objectives as the classified report and includes the same recommendation. Also, the methodology used for both reports is the same.

Background

In 2006, a Joint Intelligence Operations Center Execute Order directed the creation of joint intelligence operations centers.¹³ According to DOD guidance, the role of these centers is to support each of DOD's geographical combatant commands and certain other DOD organizations.¹⁴ The joint intelligence operations center is the focal point for the combatant command's intelligence planning, collection management, analysis, and production effort. Further, according to DOD's guidance, the center is to be organized in a manner best suited to satisfy the combatant commander's intelligence requirements and prerogatives. The primary responsibility of a joint intelligence operations center is to integrate all DOD intelligence from external defense and national intelligence organizations, multinational or partner nations, non-governmental organizations, other government departments and agencies, and law enforcement organizations to ensure that accurate, timely, and complete intelligence is available to positively affect combatant command operations. In addition, DOD's guidance outlines other responsibilities.

- Supporting joint operation planning and conducting intelligence operations in support of the combatant commander and staff and subordinate component commands, among other organizations.
- Maintaining visibility on all intelligence collection resources available to the command, aiding the combatant commander and staff in determining intelligence gaps and shortfalls in intelligence collection capability, and recommending solutions to mitigate them.
- Ensuring timely support of the combatant commander by submitting requests to intelligence community production centers.

The JIAC contains three intelligence centers—one supporting EUCOM, a second supporting AFRICOM, and a third supporting NATO—as well as several other intelligence organizations that, according to DOD documents and discussions with DOD officials, perform various functions.

¹³Joint Intelligence Operations Center (JIOC) Execute Order (EXORD), April 3, 2006.

¹⁴Joint Chiefs of Staff, Joint Publication 2-01 *Joint and National Intelligence Support to Military Operations* (Jan. 5, 2012). In addition to the six geographical combatant commands, the United States Cyber Command—a sub-unified command under United States Strategic Command—and the United States Forces Korea—a sub-unified command under United States Pacific Command—operate joint intelligence operations centers.

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- EUCOM Joint Intelligence Operations Center - Europe Analysis Center: Executes intelligence operations that are fully synchronized and integrated with theater component, national, and partner nation organizations, enables EUCOM planning and execution, and enhances senior leaders' decision-making across the entire spectrum of military operations.
 - AFRICOM Directorate for Intelligence, RAF Molesworth: Manages and executes all aspects of defense intelligence for the command, to include protecting U.S. personnel and facilities, preventing and mitigating conflict, and building defense capabilities in order to promote regional stability and prosperity.
 - NATO Intelligence Fusion Center: Supports NATO by providing intelligence to warn of potential crises and to support the planning and execution of the organization's operations, including direct intelligence support to the organization's special operations forces.
 - Regional Joint Intelligence Training Facility: Trains students from EUCOM, AFRICOM, and North Atlantic Treaty Organization nations, including the United Kingdom.
 - United States Battlefield Information Collection and Exploitation Systems: Plans, builds, and operates the Coalition Intelligence and Information Enterprise to provide on-demand coalition information sharing solutions for both episodic and enduring missions.

According to additional DOD guidance, the Assistant Secretary of Defense for Energy, Installations, and the Environment is responsible for overseeing various aspects of the department's military construction efforts.¹⁵ These responsibilities include—among other things—monitoring the execution of the military construction program to ensure the most efficient, expeditious, cost-effective accomplishment of the program, and issuing guidance for the implementation of DOD military construction policy.

Other DOD organizations, including U.S. Air Force Headquarters, the Basing Directorate of the Office of the Secretary of Defense, and the headquarters of both EUCOM and AFRICOM, made up DOD's "AOA team" for the JIAC consolidation AOA process. This a term that we use to

¹⁵DOD Directive 4270.5, *Military Construction* (Feb. 12, 2005).

describe the key organizations that contained the subject matter experts who were involved in the day-to-day work of the AOA process and worked to develop the analysis that is the foundation of the AOA process.¹⁶ Data and documentation were developed by DOD's AOA team as a part of its AOA process, from the initial concept proposal of JIAC consolidation in the fall of 2009 to the Resource Management Decision for JIAC consolidation, issued by the Secretary of Defense in April 2013. We refer to this collection of information (produced from the fall of 2009 to the spring of 2013) as DOD's "AOA body of work."

Deteriorating Condition of Current JIAC Facilities and Intelligence Collaboration with European Partners Influenced DOD's Decision to Consolidate the JIAC at RAF Croughton

According to DOD documents and discussions with department officials, DOD decided to consolidate the JIAC's constituent organizations in new facilities designed to support the JIAC's intelligence missions because DOD had determined that the JIAC's current facilities at RAF Molesworth are not designed to support these missions and are in poor condition, resulting in both financial and operational impacts. Through an AOA process in which it considered a range of alternatives, DOD's AOA team recommended RAF Croughton as the preferred alternative for JIAC consolidation, prioritizing intelligence collaboration with the United Kingdom and relationships with European partner nations as the two most critical factors.

¹⁶Over the course of our review, we asked for original data and documentation that the AOA team used in its analyses. In those instances where DOD officials stated that these data or documentation were not available, we asked to speak with DOD officials who participated in the AOA process. DOD was able to provide several officials who participated in the process. However, this was not always the case. According to DOD officials with whom we spoke, certain personnel who may have participated in the AOA process were not available. The officials provided various reasons, such as contractors who no longer worked for the relevant DOD organization, civilians who had retired, or military personnel who rotated to different assignments. DOD officials explained that, given the AOA process began in 2009 and military personnel typically rotate on 3-year assignments, these personnel could be on their second or third rotation since working as part of the AOA team.

DOD Has Determined That the JIAC's Current Facilities Are Deteriorating, Producing Financial and Operational Impacts

According to DOD documents and discussions with JIAC officials at the JIAC's current facilities at RAF Molesworth, the current facilities are (1) are not well suited to the JIAC's mission, (2) are in poor condition, and (3) are continuing to deteriorate. The facilities' condition has had both financial impacts for DOD and operational impacts on the JIAC's ability to conduct its intelligence missions, according to DOD documents and officials. As a result, the department decided to recapitalize and consolidate the JIAC's facilities.

RAF Molesworth Facilities Not Designed to Support Its Missions

In its budget justification documents for the JIAC consolidation military construction projects, the Air Force states that the intelligence mission being conducted by the JIAC has—over the past 25 years—grown substantially. According to the Air Force, this growth has created a severe shortfall of intelligence spaces, resulting in intelligence organizations that are housed in over 21 undersized facilities, including an aircraft hangar that dates from World War II, several cruise missile facilities that date from the Cold War, and leased, relocatable facilities. The Air Force explains that none of these facilities were designed for their current use, and that the shortage degrades the reliability of theater and national communications and intelligence assets.

Financial Impacts of Deteriorating and Temporary Facilities

In budget justification documents, the Air Force stated that over \$90 million in Intelligence Community funds have been spent since 2005 to sustain the JIAC's facilities and supporting utilities systems in a condition that only minimally supports the mission. Further, this documentation explains that aging and inefficient power and cooling systems—critical to the intelligence mission—are not able to be economically upgraded, due to the nature of existing facilities. For example, a report from the Defense Intelligence Agency—assessing the agency's facilities at EUCOM's Joint Intelligence Operations Center at RAF Molesworth—recommends that the original, 25-year old electrical and mechanical infrastructure for all buildings should be replaced because this infrastructure is older than its intended design life. In addition, officials from EUCOM and Air Force headquarters explained that—due to the difference in how the Air Force funds the maintenance of permanent and temporary facilities—the organization using temporary facilities is responsible for funding their maintenance costs. As a result, according to the officials, the use of these temporary facilities strains the budgets of certain JIAC organizations. We discuss this issue further later in this report.

Operational Impacts of Deteriorating Facilities

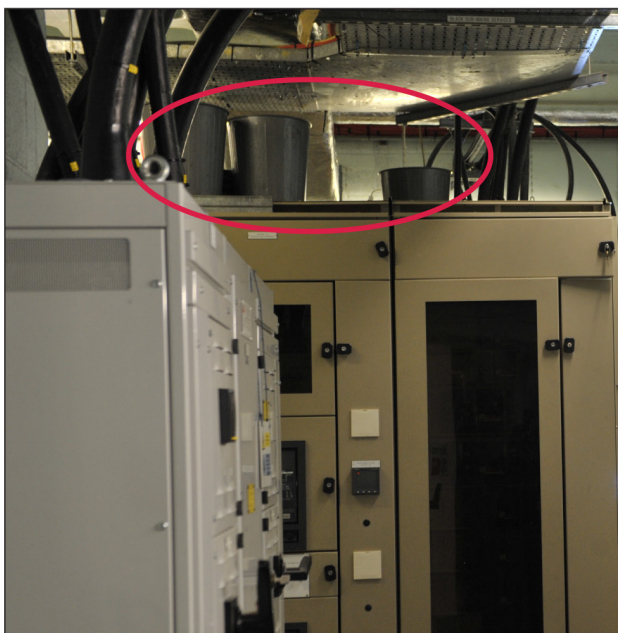
According to JIAC and EUCOM officials, as well as Air Force documentation, unanticipated power and cooling system failures cause frequent down time for intelligence analysts, wasting thousands of

personnel hours in analytical effort and exposing EUCOM and AFRICOM to intelligence blackouts. During our site visit to the current JIAC facilities at RAF Molesworth, and discussions with JIAC officials, we learned of several instances of these challenges. For example, according to JIAC officials, it is common for aging fire alarm systems in the installation's buildings to trigger false alarms. This causes evacuations during which personnel cannot conduct intelligence operations.

According to EUCOM officials, in March 2016, a leak in the roof of the JIAC's Building 100 allowed water into a power distribution panel. Officials said that this leak caused a fire that knocked out power to several of the building's utility systems, including heating, air conditioning, ventilation equipment, and sewage pumps. Furthermore, the EUCOM officials explained that Building 100 houses several key JIAC organizations, including EUCOM's Joint Intelligence Operations Center at RAF Molesworth, the center's National Geospatial Intelligence Agency component, and the center's watch floor.¹⁷ According to EUCOM officials, the loss of utility service disrupted the work environment of the building's 200 personnel for an estimated 30 hours. EUCOM officials provided the following pictures that detail the leak and fire damage.

¹⁷ According to JIAC officials, on the watch floor, the Center's personnel track key intelligence topics or regions in order to provide updates or warnings to the headquarters supported by the JIAC.

Figure 1: Water Leaking onto a Power Distribution Panel (left) and Scorch Marks Left by Fire on the Panel (right) in EUCOM Joint Intelligence Operations Center at Royal Air Force (RAF) Base Molesworth Building 100



Source: U.S. European Command Joint Intelligence Operations Center at RAF Molesworth. | GAO-16-853

In another example, the aging infrastructure of a facility originally built during the 1980s to store cruise missiles—and now used by the JIAC as office space—has resulted in operational impacts, according to JIAC officials. They explained that in some instances, due to its age, the telephone infrastructure housed in this facility has failed, bringing the phone service down for the entire installation. Because of this, according to officials, analysts cannot communicate with other analysts outside of their office space.

In addition, JIAC officials provided information regarding the impact of current buildings' condition on facility security. They explained that there are 12 sensitive compartmented information facilities operating on RAF Molesworth.¹⁸ The officials stated that while all 12 comply with intelligence

¹⁸According to Director, National Intelligence, Intelligence Community Directive, Number 705, *Sensitive Compartmented Information Facilities* (May 26, 2010), all information classified as sensitive compartmented information must be processed, used, stored or discussed in an accredited sensitive compartmented information facility.

community guidance, recurring maintenance at RAF Molesworth impacts operations by requiring escorts, suspends operations while maintenance is conducted by foreign nationals, and poses a risk for increased surveillance by adversaries. According to JIAC officials, JIAC facilities' age can lead to unexpected, security-related operational impacts. For instance, according to JIAC officials, at the 1980s cruise missile storage facility, several rounds of upgrades mean that the building is packed with multiple layers of electrical wiring, making current renovations complicated. JIAC officials told us that recently contractors removed a panel that—unbeknownst to them—controlled the building's security systems. This led to the systems' failure, an important operational impact for a facility that houses intelligence organizations.

DOD Considered Alternatives and Determined That RAF Croughton Best Meets Criteria DOD Identified for JIAC Consolidation

According to DOD documents and discussions with DOD officials, DOD's AOA team conducted an AOA process in which the team considered a range of facilities and alternatives and recommended RAF Croughton as the preferred alternative for JIAC consolidation.¹⁹ In doing so, the AOA team prioritized intelligence operations, along with bilateral and multinational intelligence collaboration as the two most critical factors influencing their decision.

DOD Consideration of Existing Permanent or Temporary Facilities to Use for JIAC Consolidation

One of the options included in the AOA process was modernization of existing facilities where feasible and construction of new facilities at RAF Molesworth. However, officials from the Office of the Secretary of Defense, Air Force Headquarters, and EUCOM explained that the AOA team did not feel that renovation of the JIAC's existing permanent and temporary facilities was feasible, given statutory requirements and service guidance. Specifically, the officials stated that according to U.S. law governing the use of operations and maintenance funding to repair a DOD facility, if the current estimate of the cost of the repair project exceeds 75 percent of the estimated cost of a military construction project

¹⁹As discussed previously in this report, we assessed information from various DOD organizations, including U.S. Air Force Headquarters, the Basing Directorate of the Office of the Secretary of Defense, and the headquarters of both EUCOM and AFRICOM. These organizations made up DOD's "AOA team" for the JIAC consolidation AOA process. This a term that we use to describe the key organizations that contained the subject matter experts who were involved in the day-to-day work of the AOA process and worked to develop the analysis that is the foundation of the AOA process.

to replace the facility, the department must provide reasons why replacement of the facility is not in the best interest of the government.²⁰

The officials explained that, given the challenges of renovating the JIAC's existing permanent facilities, the AOA team believed replacement of the JIAC's current facilities was in the best interest of the government. In addition, two temporary facilities are used to house AFRICOM's Directorate for Intelligence organization and the NATO Intelligence Fusion Center. Continued use of these facilities is not viable, according to officials, due to both Air Force guidance and budgetary considerations. According to this Air Force guidance, temporary facilities should be used for the shortest term possible (fewer than 5 years) and are used to fulfill a temporary requirement.²¹ Officials stated that these facilities have housed the Directorate for Intelligence and NATO Intelligence Fusion Center for longer than 5 years. Further, additional guidance holds that—for temporary facilities—the organization using them is responsible for funding their maintenance costs out of the organization's operations and maintenance budget.²² According to officials, this is in contrast to permanent facilities' sustainment funding, which is provided by Air Force headquarters. As a result, according to the officials, JIAC organizations must pay for the sustainment of these temporary facilities using their operations and maintenance budget, although this budget is not resourced to cover these costs. As a result, the officials explained that the use of these temporary facilities strains the JIAC organizations' operations and maintenance budget.

According to officials from the Office of the Secretary of Defense, Air Force Headquarters, and EUCOM, DOD's decision to consolidate the JIAC's organizations in a new facility designed for its mission was also predicated on the lack of existing, permanent sensitive compartmented office space available in other locations. The JIAC's organizations require a total of 239,315 square feet of secure office space to conduct their intelligence missions. The officials stated that DOD had not conducted

²⁰See 10 USC § 2811 (d)(2).

²¹Air Force Instruction 32-1032, *Planning and Programming Appropriated Fund Maintenance, Repair, And Construction Projects* (Sept. 24, 2015).

²²Air Force Instruction 32-1021, *Planning and Programming Military Construction (MILCON) Projects* (Feb. 25, 2016).

specific analysis in support of this conclusion, but that they believed no other existing DOD installation had a facility with enough empty sensitive compartmented space into which the JIAC's organizations could move.

According to officials from the Office of the Secretary of Defense, Air Force Headquarters, and EUCOM—based on the assumption that DOD would construct a new facility designed to support the JIAC's intelligence missions—in 2009 the department began its AOA process to select a location for JIAC consolidation. According to officials from the Office of the Secretary of Defense and EUCOM, at the beginning of the process, members of DOD's AOA team developed five AOA criteria that were based on their subject matter expertise concerning the EUCOM and AFRICOM theaters and the JIAC's mission. DOD's AOA team assessed alternatives using these five criteria, two of which it deemed critical.²³ The critical criteria were (1) impact on intelligence operations and (2) impact on bilateral and multinational intelligence collaboration; the other criteria were (3) impact on international agreements and relationships; (4) impact on community quality of life; and (5) business case (based on estimated military construction costs). The following is a summary—based on our review of DOD documents and discussions with department officials—of DOD's rationale for the choice of RAF Croughton as the alternative that best meets these five criteria.

DOD's First Critical Criterion Was How JIAC Consolidation Would Impact Intelligence Operations

According to a 2011 summary of preliminary AOA findings, the location of the JIAC has little impact on many aspects of its intelligence operations. For example, the document states that current information technology and networks enable the intelligence community to rapidly analyze, synthesize, and share intelligence over great distances. However, DOD's AOA team concluded that the JIAC's location in Europe has significant impact on at least three key mission areas: synchronization with the headquarters supported by the JIAC, delivery of regional intelligence training, and access to non-U.S. regional experts.

First, according to DOD officials and documents, the AOA team believed that keeping the JIAC in a time zone as close as possible to the time zone of the headquarters organizations that it supports would facilitate the most

²³Below, we discuss how DOD's AOA team evaluated these alternatives during the department's AOA process for JIAC consolidation.

effective and efficient operations. Officials from Air Force Headquarters, EUCOM, the Office of the Secretary of Defense, and the JIAC stated that DOD had not conducted specific analysis in support of this conclusion. However, the 2011 preliminary AOA summary states that the JIAC's current location in the United Kingdom means that the work schedules of JIAC personnel are closely aligned with EUCOM and AFRICOM headquarters. In addition, according to an example in documentation provided by EUCOM, locating the JIAC in the United Kingdom's time zone provides operational benefits. Specifically, it allows the JIAC's personnel to consistently interact with these headquarters during the same work day, thus providing "complete integration" of the JIAC's intelligence support into the decision making process of EUCOM's commander. According to the 2011 preliminary AOA summary, a Stuttgart, Germany location for the JIAC organizations supporting the EUCOM and AFRICOM headquarters would essentially eliminate distance-related synchronization and coordination challenges between the JIAC and these headquarters, both of which are located in Stuttgart. Further, locating the NATO Intelligence Fusion Center in Benelux would do the same for the headquarters it supports.²⁴ However, DOD officials provided two reasons why DOD's AOA team determined that a location in the United Kingdom was a better alternative than a location in either Stuttgart or Benelux. According to officials, current facilities in Stuttgart are already filled to above capacity and thus cannot accommodate the JIAC's organizations. Also, when compared to locations in the United Kingdom, these other European locations would not meet some of DOD's other AOA criteria as well, as discussed below.

The second mission area considered by the AOA team was intelligence training. JIAC officials explained that the United Kingdom locations included in DOD's AOA process provide the advantage of being close to multiple international airports located in the London area. According to an official from the JIAC's Regional Joint Intelligence Training Facility, this is important given that in fiscal year 2015, the facility's instructors traveled outside of the United Kingdom to multiple countries in order to teach 80 courses, or 44 percent of the facility's total course load.

²⁴"Benelux" is a term that refers to the area consisting of Belgium, the Netherlands, and Luxembourg.

DOD's Second Critical
Criterion Was How JIAC
Consolidation Would Impact
Bilateral and Multinational
Intelligence Collaboration

Access to non-U.S. regional experts was, according to DOD officials, the third mission area on which the AOA team focused. JIAC officials explained that a United Kingdom location for the JIAC provides unparalleled access to non-U.S. experts. According to U.S. intelligence community guidance, intelligence organizations are required to engage with entities outside of the community in order to—among other things—explore alternative perspectives and gain insights.²⁵ According to the 2011 preliminary AOA summary, locations in Europe are well suited to providing JIAC organizations with frequent and sustained personal interaction with foreign experts in Europe. Officials from EUCOM, the Office of the Secretary of Defense, and the Air Force explained that DOD's AOA team did not conduct specific analysis in support of this conclusion. However, JIAC officials explained that the United Kingdom has unique value as a JIAC location because most experts in the United Kingdom speak English and so are more accessible to JIAC personnel.

According to our review of DOD documentation and discussions with department officials, the DOD AOA team believed that United Kingdom locations facilitate the highest-quality intelligence collaboration between U.S. and allied intelligence personnel. The 2011 preliminary AOA summary states that while technology enables digital conferencing, technology cannot fully enable some of the more nuanced aspects of developing close professional relationships and trust. According to officials from EUCOM, the Office of the Secretary of Defense, and the Air Force, DOD's AOA team did not conduct specific analysis in support of this conclusion. However, JIAC officials stated they strongly believe that, for intelligence work, trust is the single most important factor in achieving high value collaboration, and that in-person communication between intelligence analysts from the United States and partner nations facilitates the development of closer personal relationships, which, in turn, builds trust. In regard to bilateral intelligence collaboration, the officials explained that JIAC locations in the United Kingdom are particularly well suited to meeting this criterion because the United Kingdom is the United States' most capable and important intelligence ally. For example, key United Kingdom intelligence facilities are located at RAF Wyton, about 66 miles from RAF Croughton, which would enable frequent in-person

²⁵Director, National Intelligence, Intelligence Community Directive 205, *Analytic Outreach* (Aug. 28, 2013).

DOD's Third Criterion Was
How JIAC Consolidation Would
Impact International
Agreements and Relationships

collaboration. JIAC officials stated that United Kingdom personnel located at RAF Wyton work on counter-terrorism issues, which are central to the mission of the portion of AFRICOM's Directorate of Intelligence assigned to the JIAC, and analysts from AFRICOM frequently collaborate in person with their United Kingdom counterparts at RAF Wyton.

According to officials from the Office of the Secretary of Defense, Air Force Headquarters, and EUCOM, DOD did not consider this third criterion to be critical, but did consider it to be "quite important." Key issues considered by the AOA team include America's national security relationship with the United Kingdom and the JIAC's collaboration and logistical support of the NATO Intelligence Fusion Center. DOD provided us with an August 2015 letter, sent to the chairs and ranking members of the House and Senate Armed Services committees by the British Ambassador to United States, which urges the members' support for keeping the JIAC in the United Kingdom and characterizes "the close cooperation" between the two countries on national security as "long standing, broad, and uniquely deep." In addition to the American - British relationship, another issue on which DOD focused for this third criterion was the location of the NATO Intelligence Fusion Center.

According to officials from the Office of the Secretary of Defense, Air Force Headquarters, and EUCOM, one of the assumptions of the AOA process was that—under any consolidation scenario—the NATO Intelligence Fusion Center would remain collocated with the JIAC's other intelligence organizations. This was for three reasons.

- The first was intelligence collaboration. According to the 2011 preliminary AOA summary, the center's colocation with the JIAC's EUCOM and AFRICOM organizations has enabled analytical collaboration, enhancing the three organizations' effectiveness.
- The second reason for DOD's focus on the NATO Intelligence Fusion Center's location was existing agreements with the center's 26 participating nations. According to the 2011 preliminary AOA summary, the memorandum of understanding establishing the center designates the United Kingdom as host nation and requires unanimous approval of changes to the memorandum. JIAC relocation scenarios in which the NATO Intelligence Fusion Center moves outside the United Kingdom would require the agreement of all 26 participating nations. Further—according to officials from the Office of the Secretary of Defense, Air Force Headquarters, and EUCOM—the commanders of both EUCOM and AFRICOM were "especially concerned" that a U.S. decision to relocate the JIAC and NATO

DOD's Fourth Criterion Was
How Consolidation Would
Impact JIAC Personnel's
Quality of Life

Intelligence Fusion Center from the United Kingdom may provide a counterproductive signal to partner nations participating in the center, and could have resulted in nations deciding to end their voluntary participation.

- The third reason for DOD's focus on the center's location was logistical and administrative support. According to JIAC officials, the memorandum of understanding establishing the center designates the United States as the nation that will provide the majority of support to the center. Thus, according to the officials, EUCOM's Joint Intelligence Operations Center at RAF Molesworth conducts all of the logistical and administrative support services for both the AFRICOM Directorate for Intelligence and the NATO Intelligence Fusion Center. This is because, when these two organizations were created, they were intended to be collocated with the EUCOM Joint Intelligence Operations Center at RAF Molesworth and thus did not require their own support personnel and services. The officials explained that separating the NATO Intelligence Fusion Center from EUCOM's Joint Intelligence Operations Center at RAF Molesworth would result in increased costs because the NATO Intelligence Fusion Center would need to hire additional personnel to perform the functions currently performed by EUCOM personnel.²⁶

According to the 2011 preliminary AOA summary, there are "long standing quality of life issues" for personnel working at the JIAC. These issues stem in part from the deteriorating condition of the current JIAC facilities at RAF Molesworth, discussed earlier in this report. For example, personnel working in those facilities experience frequent summertime failure of air conditioning equipment. According to DOD, other quality of life issues stem from the fact that the current JIAC facilities on RAF Molesworth are geographically separated from the facilities that support JIAC personnel, such as housing and commissaries, located on RAF Alconbury. The 2011 preliminary AOA summary states that the 25-40

²⁶According to estimates from an AFRICOM official, separating the AFRICOM Directorate for Intelligence from the logistical support provided by EUCOM's Joint Intelligence Operations Center would require AFRICOM to hire approximately 24 additional administrative, logistical, and security personnel in addition to an unknown number of network support personnel. Further, according to the AFRICOM official, depending on whether the positions were filled with only government civilians and enlisted personnel or filled with only contractors, the cost of these personnel is estimated to be between \$2 million and \$5 million per year.

DOD's Fifth Criterion Was the
Business Case for JIAC
Consolidation

minute drive between the two installations requires personnel to make frequent use of local roads on which it can be challenging for non-United Kingdom personnel to drive. Thus, the AOA team assessed AOA alternatives based on the degree to which they allowed for the JIAC's facilities and these support facilities to be collocated.

DOD officials stressed that the AOA team considered non-financial factors—such as intelligence collaboration and relationships with partner nations—to be more important than the cost of JIAC consolidation alternatives. Officials from the Office of the Secretary of Defense, Air Force Headquarters, and EUCOM characterized the AOA process as “cost informed but not cost driven.” However, while the AOA team did not consider the alternatives’ relative cost to be the most important factor, documentation from the AOA body of work and our discussions with DOD officials indicate that the AOA team did consider alternatives’ relative costs. Thus, the relative importance of cost in the AOA team’s analysis is somewhat unclear. Later in the report, we discuss this issue in more detail, examining the extent to which the AOA team followed best practices related to cost estimation.²⁷

There are several examples of how the AOA team addressed the Business case criterion. For instance, in a 2011 briefing on JIAC consolidation alternatives, EUCOM's Air Force component considered facility and information technology costs for a limited number of alternatives. Also, in the AOA team's 2011 preliminary AOA summary, it states that the AOA process examined estimates of military construction costs and potential savings associated with recapitalization and consolidation alternatives in order to ensure that the preferred alternative would achieve the optimum balance between capital investment and long-term base sustainment savings. In addition, throughout our discussions with officials from the Office of the Secretary of Defense, Air Force Headquarters, EUCOM, and the JIAC, officials emphasized that the cost savings DOD estimates it will achieve by consolidating the JIAC at RAF Croughton were considered throughout the AOA process. For example,

²⁷In this report, we focus on the extent to which DOD met best practices for life cycle cost estimation during its AOA process. In a separate review, we will examine DOD's post-AOA cost estimate for JIAC consolidation at RAF Croughton, evaluating the extent to which the department's estimate aligns with best practices. We plan on completing that second review in 2016.

according to officials from the Office of the Secretary of Defense and the JIAC, DOD's opportunity to save money by closing RAF Molesworth, RAF Alconbury, or both, as part of a JIAC consolidation scenario was considered early in the AOA process.

In Its Analysis of Alternatives for JIAC Consolidation, DOD Fully or Substantially Met 6 Best Practices for Conducting Such an Analysis, but Partially, Minimally, or Did Not Meet 16 Best Practices

Based on discussions with DOD officials and our review of documentation in DOD's AOA body of work, we determined that DOD followed some but not all best practices during the JIAC consolidation AOA process.²⁸ We have developed best practices that apply to all AOA processes by (1) compiling and reviewing commonly mentioned AOA policies and guidance used by different government and private-sector entities and (2) incorporating experts' comments on a draft set of practices to develop a final set of practices. Comparing DOD's AOA process to our best practices, we determined that DOD's process partially met the four characteristics of a high-quality, reliable AOA process. DOD officials stated that they believe our AOA practices do not apply—in their entirety—to DOD's process for making military construction decisions and did not use AOA best practices to guide the JIAC consolidation AOA process. However, we continue to believe that our AOA best practices should be used by DOD when making military construction decisions.

GAO Developed AOA Best Practices That Apply to All AOA Processes

Because there was no single set of practices for the AOA process that had been broadly recognized by both the government and private-sector entities, in 2016 we identified 22 best practices for conducting an AOA process. We did this by (1) compiling and reviewing commonly mentioned AOA policies and guidance used by different government and private-sector entities and (2) incorporating and vetting experts' comments on a draft set of practices to develop a final set of practices. The 22 best practices that we identified are grouped into five AOA phases, as shown in table 1.

²⁸As discussed previously in this report, to determine the extent to which DOD's AOA process for JIAC consolidation aligns with best practices for such analyses, we reviewed all data and documentation developed by DOD as a part of its AOA process from the initial concept proposal of JIAC consolidation in the fall of 2009 to the Resource Management Decision for JIAC consolidation, issued by the Secretary of Defense in April 2013. We refer to this collection of information (produced from the fall of 2009 to the spring of 2013) as DOD's "AOA body of work."

Table 1: GAO’s Analysis of Alternatives (AOA) Best Practices Grouped into the Five Phases of an AOA Process

AOA phase	Description of best practices in phase
Initialize the AOA process	Best practices that are applied before starting the process of identifying, analyzing, and selecting alternatives. This includes determining the mission need and functional requirements, developing the study time frame, creating a study plan, and determining who conducts the analysis.
Identify alternatives	Best practices that help ensure the alternatives to be analyzed are sufficient, diverse, and viable.
Analyze alternatives	Best practices that compare the alternatives to be analyzed. The best practices in this category help ensure that the team conducting the analysis uses a standard, quantitative process to assess the alternatives.
Document and review the AOA process	Best practices that would be applied throughout the AOA process, such as documenting all steps taken to initialize, identify, and analyze alternatives and to select a preferred alternative in a single document.
Select a preferred alternative	Best practice that is applied by the decision maker to compare alternatives and to select a preferred alternative.

Source: [GAO-16-22](#) | GAO-16-853

1. Initialize the AOA process: includes best practices that are applied before starting the process of identifying, analyzing, and selecting alternatives. This includes determining the mission need and functional requirements, developing the study time frame, creating a study plan, and determining who conducts the analysis.
2. Identify alternatives: includes best practices that help ensure the alternatives to be analyzed are sufficient, diverse, and viable.
3. Analyze alternatives: includes best practices that compare the alternatives to be analyzed. The best practices in this category help ensure that the team conducting the analysis uses a standard, quantitative process to assess the alternatives.
4. Document and review the AOA process: includes best practices that would be applied throughout the AOA process, such as documenting all steps taken to initialize, identify, and analyze alternatives and to select a preferred alternative in a single document.
5. Select a preferred alternative: includes a best practice that is applied by the decision maker to compare alternatives and to select a preferred alternative.

Also, we have grouped the 22 best practices into four characteristics that identify a high-quality, reliable AOA process—specifically, that it be well-documented, comprehensive, unbiased, and credible. In appendix III, we provide more information on these best practices, and below in table 2, we show how each of them are grouped into the four characteristics.

Table 2: GAO's 22 Best Practices for Analysis of Alternatives (AOA) Grouped into Four Characteristics

Characteristics	AOA best practices
Well documented: The AOA process is thoroughly described, including all source data, clearly detailed methodologies, calculations and results, and selection criteria are explained.	12. Identify significant risks and mitigation strategies 14. Tie benefits/effectiveness to mission need 18. Document AOA process in a single document 19. Document assumptions and constraints
Comprehensive: The level of detail for the AOA process ensures no alternatives are omitted and that each alternative is examined thoroughly for the project's entire life-cycle.	1. Define mission need 3. Develop AOA timeframe 8. Develop list of alternatives 11. Assess alternatives' viability 15. Develop life-cycle cost estimates (LCCEs)
Unbiased: The AOA process does not have a predisposition towards one alternative over another but is based on traceable and verified information	2. Define functional requirements 4. Establish AOA team 6. Weight selection criteria 7. Develop AOA process plan 13. Determine and quantify benefits and effectiveness 20. Ensure AOA process is impartial 22. Compare alternatives
Credible: The AOA process discusses any limitations of the analysis resulting from the uncertainty surrounding the data to assumptions made for each alternative.	5. Define selection criteria 9. Describe alternatives 10. Include baseline alternative 16. Include a confidence interval or range for LCCEs 17. Perform sensitivity analysis 21. Perform independent review

Source: GAO-16-22 | GAO-16-853

Further, the principles and practices contained in GAO's AOA best practices parallel those found in DOD and Air Force guidance on military construction and analysis for decision making. For example, according to an Air Force instruction governing the planning and programming for military construction projects, one of the required planning actions is to evaluate alternative solutions.²⁹ This guidance on planning clearly agrees with the intent of our AOA best practices, in which we state that the best

²⁹Air Force Instruction 32-1021, *Planning and Programming Military Construction (MILCON) Projects*, (Feb. 25, 2016).

practices can be applied to a wide range of activities in which an alternative must be selected from a set of possible options. The congruence between our AOA best practices and the department's guidance on these subjects demonstrates our best practices' applicability to a military construction project such as JIAC consolidation.

DOD's AOA Process Partially Met the Four Characteristics of a High-Quality, Reliable AOA Process

By comparing DOD's AOA process to our best practices, we determined that DOD's process partially met the four characteristics of a high-quality, reliable AOA process. In table 3, we summarize our assessment.

Table 3: Summary of GAO's 22 Analysis of Alternatives (AOA) Best Practices, Grouped into Four Characteristics, with GAO's Scores for DOD's AOA Process for JIAC Consolidation

AOA characteristic	Overall GAO assessment ^a
Well documented: The analysis of alternatives (AOA) process is thoroughly described, including all source data, clearly detailed methodologies, calculations and results, and selection criteria are explained.	Average Score: 2.75 out of 5 Partially met
Comprehensive: The level of detail for the AOA process ensures no alternatives are omitted and that each alternative is examined thoroughly for the project's entire life-cycle.	Average Score: 3.2 out of 5 Partially met
Unbiased: The AOA process does not have a predisposition towards one alternative over another but is based on traceable and verified information	Average Score: 3.0 out of 5 Partially Met
Credible: The AOA process discusses any limitations of the analysis resulting from the uncertainty surrounding the data to assumptions made for each alternative.	Average Score: 3.0 out of 5 Partially Met

Source: GAO analysis of Department of Defense (DOD) information. | GAO-16-853

^aIn this report, we use a five-point scale to describe our assessment of DOD's AOA process. On this scale, each of the 22 best practices and four characteristics is scored as not met, minimally met, partially met, substantially met, or fully met. We set the following numerical scores for each step on the scale: Not Met = 1.0 to 1.4; Minimally Met = 1.5 to 2.4; Partially Met = 2.5 to 3.4; Substantially Met = 3.5 to 4.4; and Fully Met = 4.5 to 5.0.

Specifically, DOD's AOA process for JIAC consolidation fully or substantially met 6 best practices, partially or minimally met 15 best practices, and did not meet 1 best practice. In table 4, we summarize our assessment. Below the table, we highlight certain best practices, providing examples from our analysis for each of the four characteristics. See appendix IV for a summary of our analysis for all 22 best practices.

Table 4: GAO's 22 Analysis of Alternatives (AOA) Best Practices, Grouped into Four Characteristics, with GAO's Scores for DOD's AOA Process

Characteristics	AOA best practices	GAO scoring of DOD AOA process
Well documented: The analysis of alternatives (AOA) process is thoroughly described, including all source data, clearly detailed methodologies, calculations and results, and selection criteria are explained.	12. Identify significant risks and mitigation strategies 14. Tie benefits/effectiveness to mission need 18. Document AOA process in a single document 19. Document assumptions and constraints	3 – Partially Met 3 – Partially Met 2 – Minimally Met 3 – Partially Met
Overall GAO Assessment^a Partially Met		Average Score: 2.75 out of 5
Comprehensive: The level of detail for the AOA process ensures no alternatives are omitted and that each alternative is examined thoroughly for the project's entire life-cycle.	1. Define mission need 3. Develop AOA timeframe 8. Develop list of alternatives 11. Assess alternatives' viability 15. Develop life-cycle cost estimates (LCCEs)	5 – Fully Met 3 – Partially Met 4 – Substantially Met 2 – Minimally Met 2 – Minimally Met
Overall GAO Assessment^a Partially Met		Average Score: 3.2 out of 5
Unbiased: The AOA process does not have a predisposition towards one alternative over another but is based on traceable and verified information	2. Define functional requirements 4. Establish AOA team 6. Weight selection criteria 7. Develop AOA process plan 13. Determine and quantify benefits and effectiveness 20. Ensure AOA process is impartial 22. Compare alternatives	5 – Fully Met 3 – Partially Met 3 – Partially Met 2 – Minimally Met 2 – Minimally Met 4 – Substantially Met 2 – Minimally Met
Overall GAO Assessment^a Partially Met		Average Score: 3.0 out of 5
Credible: The AOA process discusses any limitations of the analysis resulting from the uncertainty surrounding the data to assumptions made for each alternative.	5. Define selection criteria 9. Describe alternatives 10. Include baseline alternative 16. Include a confidence interval or range for LCCEs 17. Perform sensitivity analysis 21. Perform independent review	5 – Fully Met 2 – Minimally Met 4 – Substantially Met 1 – Not Met 3 – Partially Met 3 – Partially Met
Overall GAO Assessment^a Partially Met		Average Score: 3.0 out of 5

Source: GAO analysis of Department of Defense (DOD) information. | GAO-16-853

^aWe determined the overall assessment rating by assigning each individual rating a number: Not Met = 1, Minimally Met = 2, Partially Met = 3, Substantially Met = 4, and Fully Met = 5. Then, we took the average of the individual assessment ratings to determine the overall rating for each of the four characteristics. The resulting average becomes the Overall Assessment as follows: Not Met = 1.0 to 1.4, Minimally Met = 1.5 to 2.4, Partially Met = 2.5 to 3.4, Substantially Met = 3.5 to 4.4, and Fully Met = 4.5 to 5.0.

DOD's AOA Team Partially
Met the Characteristic of a Well
Documented AOA Process

Overall, DOD's AOA team partially met the collection of best practices that address how well an agency documented its AOA process. For example, DOD's AOA process partially met the best practice of Tying Benefits or Effectiveness to Mission Need and minimally met the best practice of Documenting the AOA Process in a Single Document.

The requirements of this best practice—Tying Benefits or Effectiveness to Mission Need—include, among other things, that the AOA team explain how each measure of effectiveness supports the mission need, and show how the measures are tied to specific mission needs and functional requirements. DOD's AOA body of work includes the 2011 preliminary AOA summary in which the AOA team provides a general explanation of how mission needs will or will not be met under each of DOD's AOA criteria. For example, in the context of the criterion "Impact on Bilateral and Multinational Intelligence Collaboration," DOD's 2011 preliminary AOA summary explains that the JIAC's location plays a key role in the complex's ability to leverage partner nation intelligence capabilities, such as those of the United Kingdom, and its proximity to the NATO Intelligence Fusion Center gives the JIAC ready access to the individual and fused intelligence capabilities of the center's 26 participating nations. This discussion indicates that, generally speaking, location of the JIAC is tied to its mission effectiveness. However, the AOA body of work does not provide evidence that the AOA team developed specific measures of effectiveness—used to quantify the benefits and effectiveness of each alternative—or tied those measures to specific mission needs. According to the actions required under the best practice Determine and Quantify Benefits/Effectiveness—on which the best practice Tying Benefits or Effectiveness to Mission Need is based—there are ways in which an agency can meet this best practice with largely qualitative criteria, like those used by the AOA team. Even in cases where it may be difficult to quantify benefits, an AOA team can either explain why benefits cannot be quantified or use scalability assessments to quantify benefits. For instance, for the criterion "Impact on Bilateral and Multinational Intelligence Collaboration," the AOA team could have estimated the number of face-to-face interactions between U.S. and United Kingdom intelligence personnel made possible by each alternative and used that as a metric to consistently compare alternatives. Or, the team could have provided evidence that it assessed other mechanisms for collaborating with partner nation personnel, in contrast with face-to-face collaboration. This type of assessment might have provided evidence that strengthens or weakens DOD's case for prioritizing face-to-face collaboration.

In addition, DOD's AOA process minimally met the best practice of Documenting the AOA Process in a Single Document. This best practice requires, among other things, that the AOA team documents all steps taken to identify, analyze, and select alternatives in a single document. DOD's AOA body of work contains one summary document: the 2011 preliminary AOA summary. However, the 2011 preliminary AOA summary does not contain all of the information in DOD's AOA body of work. Also, according to DOD officials, the AOA team produced the document in August 2011, more than one and one-half years before the end of DOD's AOA process in April 2013. Further, the officials stated that there is no other document that the department considers to be an official summary of the AOA process. According to our best practices, documentation is essential for validating and defending the AOA process. Without clear reports that compile all information, including standards used to rate and perform the analysis, the AOA's credibility could suffer because the documentation does not explain the rationale for the methodology used or the calculations underlying the analysis.

**DOD's AOA Team Partially
Met the Characteristic of a
Comprehensive AOA Process**

Overall, DOD's AOA team partially met the collection of best practices that demonstrate the comprehensiveness of an agency's AOA process. For example, DOD's AOA process fully met the best practice of Defining Mission Need and substantially met the best practice of Developing a List of Alternatives. However, DOD's AOA process minimally met the best practices of Assessing Alternatives' Viability and Developing Life-Cycle Cost Estimates.

The requirements of the best practice Defining Mission Need include, among other things, that the AOA team define the mission needs—i.e., a credible gap between current capabilities and those required to meet goals—without a predetermined solution. The department's AOA body of work included DOD 1391 forms—used to provide Congress with information on military construction projects—that include information on the gap between current JIAC facilities' capabilities and those required to meet JIAC mission needs. Examples of issues listed on the 1391 forms include a severe shortfall of intelligence spaces, resulting in missions being housed in undersized facilities, and aging and inefficient power and cooling systems critical to the intelligence mission that are not able to be economically upgraded. The forms explain that these facility shortfalls will continue to constrain the JIAC's ability to provide responsive intelligence in support of EUCOM and AFRICOM. The AOA body of work also included detailed requirements documents that laid out both the shortfalls of current JIAC facilities and the specifications for a new JIAC facility, based on the mission needs of the JIAC's organizations. Further, these

documents state that DOD had not yet determined where to consolidate the JIAC. According to this best practice, allowing mission needs to be defined in solution-specific terms creates a potential bias and could invalidate the analysis. In fully meeting the best practice, the AOA team demonstrated that this initial component of its analysis was free of bias.

Also, DOD's AOA process substantially met the best practice of Developing a List of Alternatives. This best practice requires, among other things, that the AOA team identifies and considers a wide range of alternatives to meet the mission need and perform market research to develop as many alternative solutions as possible. According to DOD officials, the department considered up to 16 alternatives. This indicates that the AOA team identified and considered a wide range of alternatives to meet the mission need. Regarding the requirement to perform market research, it seems reasonable that the alternatives developed by the AOA team were largely European, given that three of DOD's five AOA criteria—and both critical criteria—were focused on intelligence collaboration and relationships with European partner nations. According to our best practice, an AOA process like DOD's—that encompasses numerous alternatives—ensures the study provides a broad view of the issue. However, the AOA body of work did not contain evidence that the AOA team performed other types of market research that may have informed the AOA process. For example, given that some of the JIAC's military, civilian, and contractor employees—and their dependents—will live off base, the AOA team may have benefited from performing research on the commercial housing markets adjacent to the alternatives.

However, DOD's AOA process minimally met the best practice of Assessing Alternatives' Viability. This best practice's requirements include the AOA team's screening of the list of alternatives, in order to eliminate those alternatives that are not viable, and fully documenting all assumptions regarding the alternatives' viable and nonviable status—including reasons that an alternative is not viable—in order to justify the AOA process' eventual recommendation. According to DOD officials, the AOA team determined alternatives' viability by examining the alternatives using the department's own five AOA criteria discussed above. However, the DOD AOA body of work does not contain documentation indicating that the AOA team met several requirements of our best practice. For example, the body of work does not contain a documented description of the process that the AOA team used to add and remove alternatives over time—16 in total—as DOD progressed through its AOA process. DOD officials confirmed that such a document does not exist and were unable to explain how each alternative was eliminated from consideration. Also,

there is no documentation of the reasons why 15 of these alternatives were eventually considered not to be viable. According to this best practice, documenting the alternatives that are deemed nonviable is important so that decision makers can clearly see why those alternatives are not considered for further analysis. Without such documentation, DOD is less able to justify the AOA process' eventual recommendation.

Further, DOD's AOA process minimally met the best practice of Developing Life-Cycle Cost Estimates during an AOA process. The requirements of this best practice include, among other things, that the AOA team develop a life-cycle cost estimate for each alternative. This life-cycle cost estimate should include all costs from inception of the effort—in this case, JIAC consolidation—through design, development, construction, operation, maintenance, and disposal. As discussed above, while DOD focused on non-financial criteria in the AOA process, the department included consideration of alternatives' costs as part of its AOA process, under its AOA criterion "Business Case." DOD's AOA body of work provides evidence that the AOA team developed partial life cycle cost estimates as part of the AOA process. For example, the 2011 preliminary AOA summary shows the team considered life cycle costs when selecting alternatives for analysis, and a table in the document provides both military construction costs and projected cost savings or cost avoidance that are associated with each alternative.

However, the documentation in DOD's AOA body of work does not provide the information required for full life cycle cost estimates. Officials from the Office of the Secretary of Defense and Air Force Headquarters characterized the level of detail for these estimates as "extremely rough." Officials from these organizations agree that these estimates are not full life cycle cost estimates. For instance, the estimates in the 2011 preliminary AOA summary's table do not include all of the types of costs that make up the JIAC consolidation effort. According to our review of the table, it provides no evidence that its estimates include costs such as additional housing, personnel costs, support personnel, or the base operations support, which according to JIAC officials will be needed to accommodate the increased logistical requirements the JIAC and its personnel would place on RAF Croughton's infrastructure. Also, the table does not provide evidence that its estimates include all savings that DOD has estimated could be achieved through JIAC consolidation. Specifically,

while the table includes some estimated savings, the table does not include other potential savings.³⁰ For example, DOD officials have explained that the RAF Croughton alternative assumes closure of RAF Molesworth and RAF Alconbury, and according to EUCOM documentation and officials from the Office of the Secretary of Defense and Air Force headquarters, there will be a reduced number of personnel required to meet requirements for one installation (RAF Croughton) as opposed to two (RAF Molesworth and RAF Alconbury). However, these savings from this consolidation alternative were not included in the table.³¹ Further, DOD's AOA body of work has no documentation of the data or analysis that was used to produce the cost estimates found in the 2011 preliminary AOA summary and DOD officials were unable to provide these data. According to this best practice, an incomplete life-cycle cost estimate does not provide an accurate and complete view of the alternatives' costs. Without a full accounting of life-cycle costs, decision makers will not have a complete picture of the costs for each alternative and will have difficulty comparing the alternatives. This may be particularly true of DOD's AOA process for JIAC consolidation because, as discussed above, the relative importance of cost in the AOA team's analysis is somewhat unclear.

DOD's AOA Team Partially
Met the Characteristic of an
Unbiased AOA Process

Overall, DOD's AOA team partially met the collection of best practices that demonstrate the extent to which an agency conducted its AOA process in an unbiased fashion. For example, DOD's AOA process substantially met the best practice of Ensuring that the AOA Process is Impartial but minimally met the best practice of Comparing Alternatives.

There are a number of requirements for the best practice Ensuring that the AOA Process is Impartial. These requirements include that the AOA team conduct the analysis without a predetermined solution and that the AOA process informs the decision-making process rather than reflecting the validation of a predetermined solution. Although the AOA team developed the recommendation to consolidate the JIAC at RAF Croughton, this recommendation was not considered to be DOD's final

³⁰The table includes estimated annual savings, in military construction costs, compared to the status quo (defined as deferring consolidation of the JIAC).

³¹These estimated savings will be discussed in more detail in a separate review focused on DOD's cost estimate for consolidation of the JIAC at RAF Croughton.

decision until the end of the AOA process. Key documents in the AOA body work provide evidence that the AOA team conducted its analysis without a predetermined solution. For example, neither a briefing for EUCOM leadership nor the 2011 preliminary AOA summary refer to the recommendation of consolidation at RAF Croughton as the final choice of the AOA team. Also, as discussed above, the JIAC requirements document states that DOD had not yet determined where to consolidate the JIAC. In addition, according to officials from the Office of the Secretary of Defense and Air Force headquarters, a DOD organization independent of the AOA team reviewed some of the AOA team's conclusions. The officials noted that the Office of Cost Assessment & Program Evaluation—which reports directly to the Secretary of Defense and is responsible for managing DOD's process for making project funding decisions—reviewed certain documentation related to the proposal to fund JIAC consolidation at RAF Croughton. As discussed previously, DOD's body of work does not contain a documented description of the process that the AOA team used to add or remove alternatives as the department progressed through the AOA process. Therefore, we cannot fully determine the impartiality of the process. However, by substantially meeting this best practice, DOD's AOA team provided reasonable assurance to decision makers that the AOA process for JIAC consolidation can be considered to be valid and un-biased.

In addition, DOD's AOA process minimally met the best practice of Comparing Alternatives. The requirements of this best practice include, among other things, that the AOA team—or another entity in the AOA process—compare the alternatives using net present value to select a preferred alternative, if possible.³² DOD's AOA body of work does not provide evidence that the AOA team used net present value to compare alternatives and officials from the Office of the Secretary of Defense confirmed that type of comparison was not performed during the AOA process. Instead, DOD's body of work provides evidence that the AOA team used two other approaches to compare most of the alternatives to

³²Net present value is a tool that can be used to appraise multi-year projects and is the present value of expected benefits minus the present value of expected costs. The present value of a stream of future benefits or costs is its worth in terms of money paid today. Present value calculations reflect the time value of money, based on the assumption that a dollar in the future is worth less than a dollar today because the dollar today can be invested and earn interest.

each other against the department's five AOA criteria. Specifically, the 2011 preliminary AOA summary contains two tables, comparing alternatives according to these AOA criteria, as well as by certain types of costs. These tables allow an outside observer to gain some insight into the alternatives' relative scores. However, the table on alternatives does not contain each of the 11 alternatives listed in the document and the table on cost does not contain a full set of costs for each alternative. According to the best practice, it may be appropriate in certain cases to not use net present value, such as when quantifying benefits is not possible. In cases such as DOD's AOA process for JIAC consolidation—where the AOA team did not use net present value—the team should take certain steps, like documenting why net present value was not used, describe the other method that is used to differentiate between alternatives, and explain why that method has been applied. DOD's AOA body of work does not provide evidence that the AOA team took these steps. Because the AOA team did not use net present value, the comparison method used by the team did not include all alternatives or all of their costs, and the team did not explain these issues, DOD is likely to have difficulty explaining how the AOA team's comparison resulted in RAF Croughton as the preferred alternative.

DOD's AOA Team Partially Met the Characteristic of a Credible AOA Process

Overall, DOD's AOA team partially met the collection of best practices that demonstrate the credibility of an agency's AOA process. For example, DOD's AOA process fully met the best practice of Defining Selection Criteria but minimally met the best practice of Describing Alternatives.

Requirements for the best practice of Defining Selection Criteria include defining the selection criteria based on mission needs and ensuring that the criteria are independent of a particular capital asset or technological solution. DOD's body of work shows that the AOA team considered the JIAC's mission needs when developing the AOA criteria. For example, the 2011 preliminary AOA summary defines the second criterion—"Impact on Bilateral and Multinational Intelligence Collaboration"—in the context of the JIAC's mission, explaining that given the important role collaboration plays in its operations, options were assessed for their potential impacts on international intelligence partnerships. In addition, DOD's criteria are independent of a particular solution to the requirements that the AOA team was trying to meet. For instance, while the 2011 preliminary AOA summary's explanation of the criterion "Impact on Intelligence Operations" states that the JIAC's location has the potential to impact certain JIAC operations, this explanation does not use a particular location to define what the criterion means. According to this

best practice, it is essential that the selection criteria be based on the mission needs. By fully meeting this best practice, the AOA team provided confidence that bias did not enter into this part of DOD's AOA process for JIAC consolidation.

However, DOD's AOA process minimally met the best practice of Describing Alternatives. Several of our best practices assess how an AOA team includes alternatives in its AOA process. For one of these best practices—Including a Baseline Alternative—the AOA team needs to, among other things, include one alternative to represent the status quo in order to provide a basis of comparison among alternatives. We assessed that DOD's AOA team substantially met the best practice. For a summary of our analysis for this best practice, see appendix IV. However, DOD's AOA body of work does not provide evidence that the AOA team met the requirements for the best practice of Describing Alternatives, for which the AOA must provide a detailed description of all alternatives. Specifically, requirements for this best practice include that the AOA team describes alternatives in sufficient detail to allow for robust analysis and that this description is detailed enough to support the AOA team's viability, cost, and benefit/effectiveness analyses. However, in the 2011 preliminary AOA summary, the AOA team described the alternatives in basic terms, using several words or one sentence. Further, the DOD body of work does not provide sufficient detail on each alternative to allow for robust analysis. Specifically, the alternatives' descriptions do not address their ability to meet JIAC operational requirements. For example, in the 2011 preliminary AOA summary, the complete descriptions provided for the two alternatives—RAF Alconbury and U.S. Army Garrison Benelux—are “construct new facilities at RAF Alconbury” and “construct new facilities at U.S. Army Garrison Benelux,” respectively. This level of detail does not allow us to assess the difference in how these two alternatives would differ in meeting—for example—DOD's third criterion “Impact on International Agreements and Relationships.” Because the AOA team did not adequately describe or document the alternatives, the team's analysis did not provide sufficient detail and may not be credible.

DOD Officials Did Not Use
Best Practices to Guide
the JIAC Consolidation
AOA Process and Do Not
Believe All of Our AOA
Best Practices Apply to
DOD's Military
Construction Decision
Making Processes

DOD Officials Did Not Use
Best Practices to Guide the
JIAC Consolidation AOA
Process

DOD officials stated that the AOA team did not use best practices to guide the JIAC consolidation AOA process. According to an official from the Office of the Secretary of Defense, DOD organizations generally follow a standard process for developing decision briefings, like some of the briefings provided to DOD senior leaders during the AOA process. This process includes—among other things—developing screening criteria, comparing courses of action, and making a recommendation. The official explained that DOD's AOA team generally followed this approach when conducting the AOA for JIAC consolidation. At a high level, this DOD process for developing decision briefings aligns with the process described in our AOA best practices.³³ The high-level alignment notwithstanding, DOD did not fully follow best practices in its AOA process. This is because—according to officials from the Office of the Secretary of Defense and Air Force Headquarters—DOD does not have a set of best practices for conducting analysis of alternatives for military construction project decisions. Further, officials from the Office of the Secretary of Defense, EUCOM, and Air Force headquarters explained that members of the AOA team did not follow a single, particular piece of

³³For example, both processes discuss describing the background and assumptions included in the analysis, screening alternatives for viability before performing analysis based on predetermined criteria, evaluating the remaining alternatives, and selecting a preferred alternative. However, the GAO best practices provide more details regarding the process needed to initialize an analysis of alternatives, thorough documentation, the specifics involved with analyzing alternatives, and the need for an independent review of the AOA process at various stages in its development.

AOA guidance or set of AOA best practices during the AOA process.³⁴ While DOD's AOA process substantially or fully met several best practices, overall, the department partially met each of the four characteristics of a high-quality, reliable AOA process. We have found that not conforming to the best practices may lead to an unreliable AOA, and in those cases, the agency will not be positioned to ensure that the preferred solution best meets the mission needs. In addition, not fully conforming to best practices can lead to oversight challenges. For example, DOD's lack of full documentation may make it difficult for decision makers in the department and Congress to fully assess how DOD arrived at its final decision to consolidate the JIAC at RAF Croughton. Further, the consolidation of the JIAC at RAF Croughton is one of 26 initiatives that DOD has decided to carry out as part of the department's European Infrastructure Consolidation effort. Congress' oversight of similar overseas basing efforts is likely to continue as DOD implements these 26 initiatives. Also, not fully conforming to best practices may make it more difficult for DOD to defend its choice of RAF Croughton. For instance, when describing alternatives, our best practices state—in part—that documentation is essential for validating the AOA process and defending its conclusions. Similarly—according to our best practice of documenting the AOA process in a single document—without clear reports that compile all information, the study's credibility could suffer because the documentation does not explain the rationale for the methodology or the calculations underlying the analysis. Officials from the Office of the Secretary of Defense and Air Force headquarters acknowledged that DOD does not have the level of documentation that would allow GAO to recreate the AOA team's analyses and conclusions.

³⁴The Air Force has an AOA Handbook: Office of Aerospace Studies, U.S. Air Force Materiel Command, *Analysis of Alternatives (AOA) Handbook: A Practical Guide to Analyses of Alternatives* (June 2013). After reviewing the Air Force AOA guide, we determined that the Air Force guidance has language that directly addresses the majority of our AOA best practices. However, there are certain cases in which the Air Force AOA guidance differs from our AOA best practices. For example, the Air Force handbook does not recommend the use of weighting schemes as part of the AOA effectiveness methodology. This is in contrast to our AOA best practice 6, which calls for the AOA team to weight selection criteria.

DOD Officials Do Not Believe
All of Our AOA Best Practices
Apply to DOD's Military
Construction Decision Making
Processes

As discussed previously in this report, we shared our draft analysis of DOD's AOA process with the department. During our discussions, DOD officials stated that they see the value of our AOA best practices, but also provided several reasons why they believe the best practices do not all apply to DOD's process for making military construction decisions. For example, DOD officials explained that they do not believe they needed to fully adhere to our AOA best practices during their AOA process because the decision to fund the military construction project for consolidation of the JIAC at RAF Croughton was considered and then approved through the department's Program, Budget, and Review process.³⁵ While this is the case, and we assessed documentation from that process for our review, DOD's Program, Budget, and Review process was not a substitute for conducting a robust AOA for JIAC consolidation. This is because—according to DOD officials—DOD's Program, Budget, and Review process for the JIAC consolidation project occurred at the end of DOD's AOA process and, during the Program, Budget, and Review process, the department considered only the preferred solution of RAF Croughton. Thus, the Program, Budget and Review process cannot serve as a substitute for an AOA process that adheres to all of the AOA best practices.

Also, according to department officials, the professional military judgment of senior DOD leaders played a significant role in their decision to fund the military construction project for consolidation of the JIAC at RAF Croughton and thus diminished the need to fully adhere to our AOA best practices during the AOA process. The officials with whom we discussed our preliminary observations explained that our best practices' focus on analyses supporting AOA decision making do not fully account for the role of professional military judgment in the Program, Budget and Review process. In the case of JIAC consolidation, DOD officials explained that RAF Croughton entered the Program, Budget and Review process as the preferred solution endorsed by the commanders of both EUCOM and AFRICOM; at the process' conclusion, the Deputy Secretary of Defense

³⁵According to DOD officials, the Planning, Programming, and Budgeting process in which the JIAC consolidation military construction project was considered was part of the department's Planning, Programming, Budgeting, and Execution process. According to DOD Directive 7045.14, *The Planning, Programming, Budgeting, and Execution (PPBE) Process* (Jan. 25, 2013), this process serves as the annual resource allocation process for DOD within its 4-year planning cycle.

approved RAF Croughton. However, our AOA best practices incorporate the professional judgment of senior agency officials. Specifically, according to our best practices, two of the key entities involved in the AOA process—the customer and decision maker—are expected to exercise their professional judgment in making key decisions.³⁶ For example, in our best practice of Defining Mission Need, the customer defines the gap between current capabilities and those required to meet the agency's goals. Also, for our best practice Define Selection Criteria, the AOA team or the decision maker defines selection criteria based on the mission need. Our assessment that the AOA team fully met both of these best practices—discussed in more detail later in this report—is evidence that DOD can follow these AOA best practices while its leaders exercise their professional military judgment.

In addition, DOD officials stated that our best practices seem to apply more to AOA processes for acquisition of a weapons system than to the department's decisions about military construction. However, we believe that our AOA best practices can be applied to a wide range of activities in which an alternative must be selected from a set of possible options, as well as to a broad range of capability areas, projects, and programs—including DOD's military construction decision making processes. In developing our AOA best practices, we reviewed a variety of U.S. government guidance, including several DOD sources.³⁷ Further, we have, in related work, applied our AOA best practices to AOA processes that concern national security facilities. In these audits, we have generally found that agencies did not fully conform to AOA best practices. In most cases, we assessed those agencies' AOA processes as partially meeting or not meeting our best practices. In those cases, we recommended that

³⁶The customer refers to the program office, service, or agency that identifies a mission need; the decision maker is the person or entity that signs off on the final decision and analysis documented by the AOA report. We describe the role of the customer and decision maker in appendix III. The best practices that include the customer or decision maker are Define Mission Need, Define Functional Requirements, Develop AOA Time Frame, Define Selection Criteria, Weight Selection Criteria, and Compare Alternatives.

³⁷The DOD sources include the following guidance: Air Force, Office of Aerospace Studies, U.S. Air Force Materiel Command, *Analysis of Alternatives (AOA) Handbook: A Practical Guide to Analyses of Alternatives*, the Defense Acquisition Guidebook, DOD Instruction 5000.02, Operation of the Defense Acquisition System (Jan. 7, 2015), and the Army Cost Benefit Guide, 3rd Ed. (Apr. 24, 2013). In appendix II, we discuss these sources in more detail.

agencies use such best practices in the future and agencies have generally concurred with our recommendations. For example, in 2014, we conducted an audit similar to our analysis of DOD's AOA process for JIAC consolidation, examining three projects in which the National Nuclear Security Administration designed and constructed facilities.³⁸ Our analysis of the National Nuclear Security Administration's facility projects indicated that each project's AOA partially met the best practices for conducting an AOA process. This raised concerns about the reliability of these AOAs, and we made a recommendation that the agency update its project management requirements by incorporating best practices for conducting an AOA. The National Nuclear Security Administration concurred and has begun implementing our recommendation. The fact that DOD's AOA team fully or substantially met six of our best practices indicates that subject matter experts engaged in a military construction decision making process can follow these best practices.

Further, the principles and practices contained in GAO's AOA best practices parallel those found in DOD and Air Force guidance on military construction and analysis for decision making. For example, according to a DOD directive governing military construction, the department must monitor the execution of its military construction program to ensure—among other things—the most cost-effective accomplishment of the program. Our AOA best practice “Develop life-cycle cost estimates” focuses on providing decision makers with the information they need to assess the cost-effectiveness of alternatives. Also, according to an Air Force instruction governing the planning and programming for military construction projects, one of the required planning actions is to evaluate alternative solutions.³⁹ This guidance on planning is consistent with our AOA best practices, in which we state that the best practices can be applied to a wide range of activities in which an alternative must be selected from a set of possible options. We discuss the alignment of our best practices with DOD and Air Force guidance in more detail in appendix II.

³⁸GAO, *DOE and NNSA Project Management: Analysis of Alternatives Could Be Improved by Incorporating Best Practices*, [GAO-15-37](#) (Washington, D.C.: Dec. 11, 2014).

³⁹Air Force Instruction 32-1021, *Planning and Programming Military Construction (MILCON) Projects*, (Feb. 25, 2016).

Finally, as stated earlier, DOD does not have guidance for applying AOA best practices when making military construction decisions. According to DOD officials, they were concerned that application of GAO's AOA best practices to all military construction projects is not practical, given the number of personnel and financial resources that the officials believe would be needed to conduct the analyses required by the best practices. However, DOD could apply our AOA best practices for certain military construction projects, perhaps establishing a threshold for the use of the best practices in military construction decisions that require a higher funding level. For example, DOD could apply our AOA best practices for military construction projects above a certain funding threshold—such as the JIAC—for which Air Force military construction guidance encourages phasing of large funded projects over multiple years.⁴⁰ Without guidance for using AOA best practices when conducting AOA assessments for certain military construction projects, DOD and Congress may face oversight challenges, and DOD may continue to have trouble justifying its decisions for projects in the future.

Conclusions

DOD's determination that it needed new facilities to house the JIAC was rooted in the recognition that the inadequacy of current facilities at RAF Molesworth had operational and financial impacts affecting the intelligence center's ability to effectively support the missions of EUCOM, AFRICOM, and U.S. allies. Consequently, the department chose criteria to guide its AOA team in selecting a preferred course of action, and the reasoning behind DOD's eventual decision to use military construction funding to build new facilities at RAF Croughton was explained in DOD documentation and by the department's officials. However, our examination of their AOA process against GAO's best practices for conducting an analysis of alternatives identified shortcomings in DOD's process. As officials noted, DOD does not have a set of best practices for conducting analysis of alternatives for military construction project decisions and the AOA team did not follow a particular piece of guidance or previously identified best practices as they carried out their analysis. As a result—especially in regard to documentation—DOD was not

⁴⁰See Air Force Instruction 32-1021, *Planning and Programming Military Construction (MILCON) Projects*, which states that OMB Circular A-11 encourages phasing of large funded projects into complete and usable phases, with phases in multiple years, when feasible, in lieu of incrementing projects.

optimally positioned to explain its choice of RAF Croughton. In our previous work assessing AOA processes for national security facilities, we found that agencies did not fully conform to AOA best practices and recommended that agencies use such best practices in the future; agencies generally concurred with our recommendations. Without guidance directing that military construction AOA processes be conducted in accordance with identified best practices, DOD will not be positioned to fully provide reasonable assurance that decisions in similar future cases are the result of a high-quality, reliable AOA process and may result in difficulty for DOD and Congress as they provide oversight over these decisions.

Recommendation for Executive Action

To aid DOD in conducting future AOA processes that fully follow best practices, we recommend that the Secretary of Defense direct the Assistant Secretary of Defense for Energy, Installations, and the Environment to develop guidance requiring the use of AOA best practices, including those practices we have identified, and in this guidance, the Assistant Secretary should define the types of military construction decisions for which these AOA best practices should be required.

Agency Comments and Our Evaluation

We provided a draft of the classified version of this report to DOD for review and comment; the department provided technical comments that we considered and incorporated as appropriate. DOD also provided written comments on our recommendation, which are reprinted in appendix V.

In its written comments, DOD did not concur with our recommendation. Specifically, DOD disputes that our 22 best practices for a reliable AOA process apply to basing or military construction decision-making processes and therefore does not believe that the department should incorporate these best practices into its military construction decision-making process.

We continue to believe that our AOA best practices can be applied to a wide range of activities in which an alternative must be selected from a set of possible options, as well as to a broad range of capability areas,

projects, and programs—including DOD’s military construction decision-making processes. As discussed in our report, during GAO’s development of our AOA best practices, we reviewed a variety of U.S. government guidance, including several DOD sources.⁴¹ Also, during discussions with DOD officials over the course of our audit, officials stated that they see the value of our AOA best practices. In addition, when DOD provided comments on our draft analysis of its AOA process, department officials demonstrated through their comments that they believe the JIAC AOA team was able to follow almost all of the best practices and meet the practices’ requirements.⁴²

Further, in its written comments, DOD states that it does not believe our 22 AOA best practices are applicable to basing decisions in an operational theater that must take into account a number of subjective factors such as best military judgment. However, as discussed in our report, our AOA best practices incorporate the professional judgment of senior agency officials. Our assessment that the JIAC AOA team fully met two best practices that specifically include officials’ professional judgment is evidence that DOD can follow these AOA best practices while its leaders exercise their professional military judgment.⁴³ Thus, we continue to believe that our AOA best practices should be applied to a variety of decision-making processes, including those that involve professional judgment.

⁴¹These sources include the Air Force AOA Handbook discussed previously; the Defense Acquisition Guidebook (Defense Acquisition University, *The Defense Acquisition Guidebook*, accessed January 20, 2016, <https://dag.dau.mil/Pages/Default.aspx>); Department of Defense, *Operation of the Defense Acquisition System*, DOD Instruction 5000.02, (Jan. 7, 2015); and Army, *Army Cost Benefit Analysis Guide* (Apr. 24, 2013). We discuss these sources further in appendix II.

⁴²As discussed in appendix II, we incorporated these comments into our final scoring of the JIAC AOA process.

⁴³As discussed in our report, according to the best practices, two of the key entities involved in the AOA process—the customer and decision maker—are expected to exercise their professional judgment in making key decisions. For example, in our best practice of Defining Mission Need, the customer defines the gap between current capabilities and those required to meet the agency’s goals. Also, for our best practice Define Selection Criteria, the AOA team or the decision maker defines selection criteria based on the mission need.

In addition, in its written comments, DOD explained that it took issue with our use of the AOA best practices because the practices were published after the department finished the JIAC AOA process. While this is the case, our AOA best practices are based on longstanding, fundamental tenants of sound decision making and economic analysis. The best practices include steps such as an agency defining its mission needs, developing a list of alternatives, assessing those alternatives' viability, and ensuring that its AOA process is impartial. When we asked DOD to provide a list of specific AOA best practices that the department believes do not apply to the basing or military construction decision-making processes, the department declined to identify the AOA best practices that it believes do not apply. Further, as discussed in this report, the principles and practices contained in our AOA best practices parallel those found in DOD and Air Force guidance on military construction and economic analysis for decision making.

In its written comments, DOD also explained that it does not concur with our recommendation that the department develop guidance requiring the use of AOA best practices, including those practices we have identified. However, we continue to believe that our recommendation would assist DOD in fully providing reasonable assurance that decisions in similar future cases are the result of a high-quality, reliable AOA process. This is because, in our assessment of DOD's AOA process for JIAC consolidation, we found that the department's process only partially met each of the four characteristics of a high-quality, reliable AOA process. In our previous work on AOA processes, we have found that not fully conforming to the best practices may lead to an unreliable AOA, and in those cases, the agency will not be positioned to ensure that the preferred solution best meets the mission needs.

Explaining its reasons for not concurring with our recommendation, DOD stated that the JIAC consolidation military construction project was developed and communicated to the Congress in a way that is consistent with both the statute governing DOD's military construction projects and the department's "long-standing, supporting policies."⁴⁴ For this report, we were asked to review the key considerations that influenced DOD's decision to consolidate the JIAC at RAF Croughton and the extent to

⁴⁴Section 2802(c) of title 10, United States Code.

which DOD's AOA process for JIAC consolidation aligns with best practices for such analyses. Thus, we did not review DOD's compliance with the statute. As discussed in our report, the existing policies that DOD followed in making its decision on the location for JIAC consolidation were not sufficient to ensure a fully reliable AOA process. For example, DOD officials explained that they do not believe they needed to fully adhere to our AOA best practices during their AOA process because the decision to fund the JIAC consolidation military construction project was considered—and then approved—through the department's Program, Budget, and Review process. As we note in our report, we assessed documentation from that process for our review, but found that DOD's Program, Budget, and Review process was not a substitute for conducting a robust AOA for JIAC consolidation. This is because—according to DOD officials—DOD's Program, Budget, and Review process for the JIAC consolidation project occurred at the end of DOD's AOA process. Further, during the Program, Budget, and Review process, the department considered only the preferred solution of RAF Croughton. Thus, the Program, Budget and Review process cannot serve as a substitute for an AOA process that adheres to all of the AOA best practices. In addition, according to officials from the Office of the Secretary of Defense and Air Force Headquarters, DOD does not have a set of best practices for conducting an AOA for military construction project decisions.

Because DOD's existing processes may not be sufficient to ensure fully reliable AOA processes in the future—and DOD officials acknowledged that the department does not have AOA best practices for basing or military construction decisions—we continue to believe that implementing our recommendation would assist DOD in ensuring that, in the future, the department makes robust decisions concerning key facilities. Also, because our recommendation is that the Assistant Secretary of Defense for Energy, Installations, and the Environment should—in guidance—define the types of military construction decisions for which AOA best practices should be required, we believe that our recommendation provides DOD with reasonable flexibility to incorporate the AOA best practices into the department's existing processes.

Without guidance directing that certain military construction AOA processes be conducted in accordance with identified best practices, the Congress may not have complete information to inform its oversight of DOD's future military construction decisions. This conclusion is based on our assessment of DOD's AOA process for JIAC consolidation. Specifically, that DOD's lack of full AOA documentation may make it

difficult for decision makers in both the department and Congress to fully assess how DOD arrived at its final decision to consolidate the JIAC at RAF Croughton, as oversight on this issue continues. For example, in May 2016, the House of Representatives passed H.R. 4909.⁴⁵ Section 1623 of the bill would, if enacted, limit DOD's fiscal year 2017 obligation or expenditure of funding for intelligence manpower positions for JIAC operation until the Secretary of Defense provides the Congress with—among other things—a revised AOA for JIAC basing that is informed by the findings of our report and uses best practices. Because our AOA best practices call for robust documentation as part of the AOA process, implementing our recommendation would assist DOD in providing the Congress with the type of information that could better meet the Congress' future oversight needs, for similar types of projects.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the date of this report. At that time, we will send copies of this report to the appropriate congressional committees and to the Secretaries of Defense, the Army, the Navy, and the Air Force; the Commandant of the Marine Corps; and the Assistant Secretary of Defense for Energy, Installations, and Environment. In addition, this report will be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-4523 or leporeb@gao.gov. Contact points for our Offices

⁴⁵H.R. 4909 is the House of Representatives' version of the bill for the National Defense Authorization Act for fiscal year 2017. The Senate bill does not have a similar provision and if enacted, would authorize \$53.1 million in funding for Phase 3 of JIAC consolidation at RAF Croughton. See S. 2943, § 4601 passed by the Senate on June 14, 2016.

of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix VI.

A handwritten signature in black ink, reading "Brian Lepore". The signature is fluid and cursive, with the first name "Brian" and the last name "Lepore" clearly distinguishable.

Brian J. Lepore
Director
Defense Capabilities and Management

List of Requesters

The Honorable John S. McCain
Chairman
Committee on Armed Services
United States Senate

The Honorable Mark Kirk
Chairman
The Honorable Jon Tester
Ranking Member
Subcommittee on Military Construction, Veterans Affairs,
and Related Agencies
Committee on Appropriations
United States Senate

The Honorable Mac Thornberry
Chairman
Committee on Armed Services
House of Representatives

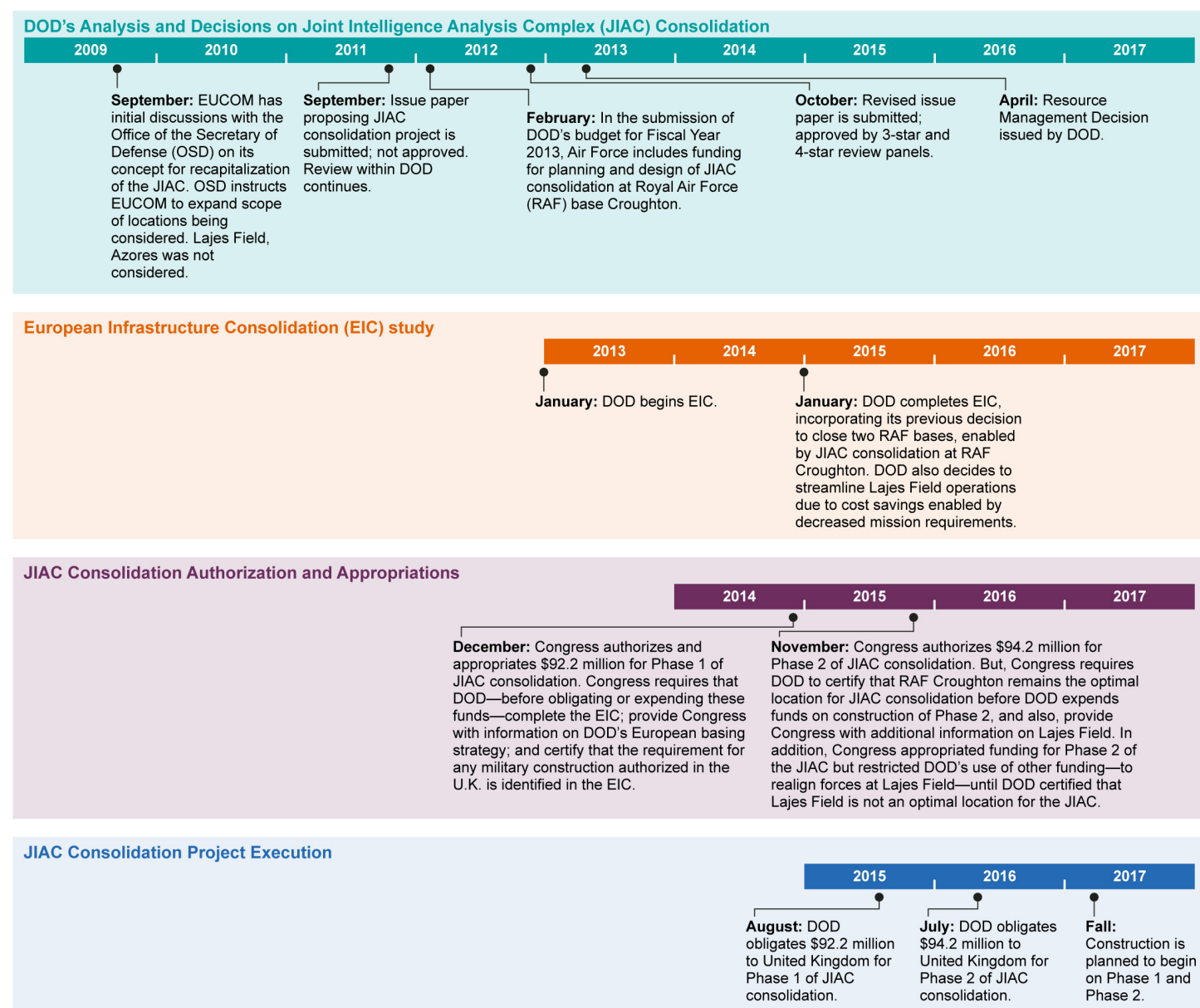
The Honorable Jason Chaffetz
Chairman
Committee on Oversight and Government Reform
House of Representatives

The Honorable Devin Nunes
Chairman
Permanent Select Committee on Intelligence
House of Representatives

The Honorable Rodney Frelinghuysen
Chairman
Subcommittee on Defense
Committee on Appropriations
House of Representatives

Appendix I: Timeline of Key Joint Intelligence Analysis Complex (JIAC) Consolidation Events, 2009 – 2016

Figure 2: Key Events for JIAC Consolidation at Royal Air Force (RAF) Base Croughton, 2009 – 2016



Source: GAO analysis of Department of Defense (DOD) information and statements from officials. | GAO-16-853

Appendix II: Scope and Methodology

In order to address our research objectives, we assessed information from various Department of Defense (DOD) organizations, including U.S. Air Force Headquarters, the Basing Directorate of the Office of the Secretary of Defense, and the headquarters of both the U.S. European and Africa Commands (EUCOM and AFRICOM).¹ For the purposes of this audit, these organizations made up DOD’s “AOA team” for the AOA process for consolidation of its Joint Intelligence Analysis Complex (JIAC). This a term that we use to describe the key organizations that contained the subject matter experts who were involved in the day-to-day work of the AOA process and worked to develop the analysis that was the foundation of the AOA process.² We also visited various components of the JIAC at Royal Air Force (RAF) base Molesworth, the JIAC’s support facilities located at RAF Alconbury, and the planned future JIAC site at RAF Croughton.

Considerations That Influenced DOD’s Decision to Consolidate the JIAC at RAF Croughton

To describe the considerations that influenced DOD’s decision to consolidate the JIAC at RAF Croughton, we reviewed various DOD documents describing the condition of the JIAC’s current facilities, including Air Force budget justification documents submitted to the Congress for the JIAC consolidation military construction projects. During our site visit to the various components of the JIAC at RAF Molesworth and its support facilities located at RAF Alconbury, we met with JIAC officials to learn about the facilities’ condition, discussing—among other things—how their condition can affect financial and operational impacts. In order to describe the five criteria DOD applied in its decision to consolidate the JIAC at RAF Croughton—and key issues related to those

¹Other organizations with which we met, or from which we gathered information, include the Office of the Director National Intelligence, the Defense Intelligence Agency, and Defense Information Systems Agency.

²Over the course of our investigation, we asked for original data and documentation that the AOA used in its analyses. In lieu of available data or documentation, we asked to speak with DOD officials who participated in the AOA process. DOD was able to provide several officials who participated in the process. However, this was not always the case. According to DOD officials with whom we spoke, certain personnel who may have participated in the AOA process were not available. The officials provided various reasons, such as contractors who no longer worked for the relevant DOD organization, civilians who had retired, or military personnel who rotated to different assignments. DOD officials explained that, given the AOA process began in 2009 and military personnel typically rotate on three-year assignments, these personnel could be on their second or third rotation since working as part of the AOA team.

criteria—we reviewed DOD documentation from its AOA process, such as a 2011 preliminary summary of the process; interviewed officials from DOD’s AOA team; and reviewed additional, related documents, such as Air Force guidance that address requirements for the use of temporary facilities.³

The Extent to Which DOD’s Analysis of Alternatives Process for Its JIAC Consolidation Project Aligns with Best Practices for Such Analyses

To determine the extent to which DOD’s analysis of alternatives process for its JIAC consolidation project aligns with best practices for such analyses, we reviewed all data and documentation developed by DOD as a part of its AOA process from the initial concept proposal of JIAC consolidation in the fall of 2009 to the Resource Management Decision for JIAC consolidation, issued by the Secretary of Defense in April 2013. We refer to this collection of information (produced from the fall of 2009 to the spring of 2013) as DOD’s “AOA body of work.” In this study, we cite key documents from DOD’s body of work with abbreviated titles. For example, in the fall of 2011, EUCOM produced a preliminary summary of DOD’s AOA efforts—up to that point in the process—named *Analysis of Alternatives (AOA) for Recapitalization of Intelligence Facilities at RAF Molesworth*. We refer to this document as the “2011 preliminary AOA summary.” In addition, we discussed DOD’s AOA process for JIAC consolidation with officials from organizations in the AOA team and at the current JIAC. After collecting available data and documentation from DOD, we evaluated DOD’s AOA body of work against GAO’s 22 AOA best practices. In appendix III, these best practices are described in detail. Their applicability to DOD’s military construction process is discussed in more detail below.⁴ We then scored DOD’s AOA body of

³Air Force Instruction 32-1032, *Planning and Programming Appropriated Fund Maintenance, Repair, and Construction Projects* (Sept. 24, 2015).

⁴These best practices were originally published in GAO, *Amphibious Combat Vehicle: Some Acquisition Activities Demonstrate Best Practices; Attainment of Amphibious Capability to Be Determined*, [GAO-16-22](#), (Washington, D.C.: Oct. 28, 2015). To evaluate DOD’s AOA process, we took the following steps: (1) two GAO analysts separately examined the AOA information received from DOD, providing a score for each of the 22 best practices; (2) a third GAO analyst adjudicated any differences between the two analysts’ initial scoring; (3) a GAO specialist on AOA best practices, independent of the audit team, reviewed the team’s adjudicated AOA documentation and scores, cross-checking the scores and all of the analyses for consistency.

work against each best practice.⁵ The team used the average of the scores for each of the individual best practices to determine an overall score for the four summary characteristics for a reliable AOA process—well-documented, comprehensive, unbiased, and credible.⁶ Next we shared our draft analysis with DOD, asking that the department provide technical comments and any additional documentation that might impact our assessment. We then incorporated these additional comments and additional documentation to ensure our analysis included all available information. Finally, we applied the same methodology and scoring process explained above to revise our initial analysis based on DOD's technical comments and any additional evidence received. For those characteristics of the AOA process that received a lower than average score, we met with DOD officials to discuss potential reasons why they did not conform to best practices for those parts of the AOA process. Examining DOD's AOA process for JIAC consolidation with our AOA best practices allowed us to assess the strengths and weaknesses of the department's process. Our best practices were not used to determine whether DOD made the correct decision on the location for JIAC consolidation or whether the department would have arrived at a different conclusion had it more fully conformed to our best practices. Rather, we used our best practices to assess the degree to which DOD can provide reasonable assurance that its process met each of the four characteristics of a high-quality, reliable AOA process. In the course of applying our AOA best practices to information in DOD's AOA body of work, we assessed the reasonableness of the information we collected. We determined that the information from DOD's AOA body of work is sufficiently reliable for the purposes of describing DOD's rationale for choosing RAF Croughton

⁵GAO's best practices define five different qualitative and quantitative categories for scoring. The five-point qualitative system we used is as follows. Fully Meets: DOD provided complete evidence that satisfies the elements of the best practice; Substantially Meets: DOD provided evidence that satisfies a large portion of the elements of the best practice; Partially Meets: DOD provided evidence that satisfies about half of the elements of the best practice; Minimally Meets: DOD provided evidence that satisfies a small portion of the elements of the best practice; and Does Not Meet: DOD provided no evidence that satisfies any of the elements of the best practice. The corresponding quantitative categories are as follows. Not Met = 1, Minimally Met = 2, Partially Met = 3, Substantially Met = 4, and Fully Met = 5.

⁶The resulting average score, for each characteristic, corresponds to one of the five qualitative categories, as follows: Not Met = 1.0 to 1.4, Minimally Met = 1.5 to 2.4, Partially Met = 2.5 to 3.4, Substantially Met = 3.5 to 4.4, and Fully Met = 4.5 to 5.0.

as the location for JIAC consolidation and comparing DOD's AOA process to our 22 best practices for a reliable AOA process.

Applicability of GAO's AOA Best Practices to Decision Making in DOD's Military Construction Process

In GAO's development of our AOA best practices, we reviewed a variety of U.S. government guidance, including several DOD sources.⁷ These DOD sources include the Air Force AOA Handbook discussed previously,⁸ the Defense Acquisition Guidebook,⁹ DOD's Instruction on Operation of the Defense Acquisition System (DODI 5000.02),¹⁰ and the *Army Cost Benefit Analysis Guide*.¹¹ We have previously reported that our AOA best practices can be applied to a wide range of activities in which an alternative must be selected from a set of possible options, as well as to a broad range of capability areas, projects, and programs.¹² Further, the principles and practices contained in GAO's AOA best practices parallel those found in DOD and Air Force guidance on military construction and economic analysis for decision making. The congruence between our AOA best practices and the department's guidance on these subjects demonstrates the best practices' applicability to AOA processes for military construction projects such as JIAC consolidation.

For example, according to a DOD directive governing military construction, the Assistant Secretary of Defense for Energy, Installations and Environment must monitor the execution of its military construction program to ensure—among other things—the most cost-effective accomplishment of the program.¹³ This principal of cost effectiveness

⁷For an explanation of the AOA process and description of each best practice, see appendix III.

⁸Air Force, Office of Aerospace Studies, U.S. Air Force Materiel Command, *Analysis of Alternatives (AOA) Handbook: A Practical Guide to Analyses of Alternatives* (June 2013).

⁹Defense Acquisition University, *The Defense Acquisition Guidebook*, accessed January 20, 2016, <https://dag.dau.mil/Pages/Default.aspx>.

¹⁰DOD Instruction 5000.02, *Operation of the Defense Acquisition System* (Jan. 7, 2015).

¹¹Army, *Army Cost Benefit Analysis Guide* (Apr. 24, 2013).

¹²GAO, *Amphibious Combat Vehicle: Some Acquisition Activities Demonstrate Best Practices; Attainment of Amphibious Capability to be Determined*, [GAO-16-22](#) (Washington, D.C.: Oct. 28, 2015).

¹³DOD Directive 4270.5, *Military Construction* (Feb. 12, 2005).

aligns with GAO's AOA best practice Develop Life-cycle Cost Estimates, which focuses on providing decision makers with the information they need to assess the cost-effectiveness of alternatives. Further, DOD Instruction 7041.03, on economic analysis for decision making, contains numerous procedures that closely parallel those called for in our AOA best practices.¹⁴ There are several examples that demonstrate how this instruction parallels our AOA best practices.

- According to DOD Instruction 7041.03, the statement of the objective should not assume a specific means of achieving the desired result. If such an assumption is made, the statement of the objective undermines the analytical purpose of the economic analysis by prejudging the result and should be avoided. Our AOA best practice Define Mission Need states that the agency defines the mission needs (i.e., a credible gap between current capabilities and those required to meet the goals articulated in the strategic plan) without a predetermined solution and that allowing mission needs to be defined in solution-specific terms creates a potential bias and could invalidate the analysis.
- DOD Instruction 7041.03 states that all reasonable ways of satisfying the objective must be documented and discussed; further, careful attention must be given to identifying alternatives. According to our AOA best practice Develop List of Alternatives, the AOA team should identify and consider a diverse range of alternatives to meet the mission need; and that an AOA process encompasses numerous alternatives in order to ensure that the study provides a broad view of the issue.
- DOD Instruction 7041.03 also states that an economic analysis should include a recommendation of the preferred alternative; further, the results of the economic analysis—including all calculations and sources of data—must be documented down to the most basic inputs to provide an auditable and stand-alone document. According to our AOA best practice Document AOA Process in a Single Document, the AOA team should produce a document that clearly states the preferred alternative, and documents all steps taken to identify, analyze, and select alternatives.

¹⁴DOD Instruction 7041.03, *Economic Analysis for Decision-making* (Sept. 9, 2015).

There are also several examples that demonstrate how our AOA best practices parallel Air Force guidance. For instance, Air Force Policy Directive 32-10, which establishes policy for Air Force Installations and Facilities, states that its civil engineers should—among other things—reduce the life-cycle costs of facilities by making the full costs of products and services visible to customers.¹⁵ This principle corresponds with the intent of our AOA best practice Develop Life-cycle Cost Estimates, which—as discussed above—requires the AOA team to develop a life-cycle cost estimate for each alternative, including all of the project’s costs. Also, according to Air Force Instruction 32-1021 on the planning and programming for military construction projects, one of the required planning actions is to evaluate alternative solutions.¹⁶ This guidance on planning agrees with the intent of our AOA best practices, in which we state that the best practices can be applied to a wide range of activities in which an alternative must be selected from a set of possible options. Further, Air Force Instruction 32-1021 states that existing assets are to be evaluated in order to determine the most economical and effective means of satisfying facility needs. Our AOA best practices parallel this guidance. Specifically, our AOA best practice Include Baseline Alternative requires the AOA team to include one alternative that represents the status quo to provide a basis of comparison among alternatives.

In addition, Air Force Instruction 65-501 on economic analysis states that economic analysis must be done for military construction projects before an alternative has been chosen, i.e. during the AOA process.¹⁷ Several of our AOA best practices closely align with the specific requirements of this economic analysis for Air Force military construction projects. For example, according to this Air Force instruction, the project cost estimate for every alternative in an economic analysis must be of the same quality and accuracy, and will normally use the same estimating tool or method as was used for the originally proposed project. Our AOA best practice Develop AOA Process Plan echoes this guidance, requiring that the AOA team create a plan to include—among other things—the proposed

¹⁵Air Force Policy Directive 32-10, *Civil Engineering: Installations and Facilities* (Mar. 4, 2010).

¹⁶Air Force Instruction 32-1021, *Civil Engineering: Planning and Programming Military Construction Projects* (Feb. 25, 2016).

¹⁷Air Force Instruction 65-501, *Economic Analysis* (Aug. 29, 2011).

methodologies for analyzing alternatives and measures that are used to rate, rank, and decide among the alternatives. Air Force Instruction 65-501 also states that fair, unbiased and accurate cost estimates for each alternative in an economic analysis are essential to a fair and reasonable comparison of alternatives. Our AOA best practice Perform Independent Review parallels the instruction. Specifically, our best practices state that the AOA process should be an unbiased inquiry into the costs, benefits, and capabilities of all alternatives and that an independent review is one of the most reliable means to validate an AOA process. Without such a review, the AOA results are more likely to include organizational bias or lack the thoroughness needed to ensure that a preferred solution—as opposed to a favored solution—is chosen.

Appendix III: Best Practices for the Analysis of Alternatives Process

Background and Introduction

Many guides have described an approach to Analysis of Alternatives (AOA); however, there is no single set of practices for the AOA process that has been broadly recognized by both the government and private-sector entities. GAO has identified 22 best practices for an AOA process by (1) compiling and reviewing commonly mentioned AOA policies and guidance used by different government and private-sector entities and (2) incorporating experts' comments on a draft set of practices to develop a final set of practices.¹

These practices can be applied to a wide range of activities in which an alternative must be selected from a set of possible options, as well as to a broad range of capability areas, projects, and programs. These practices can provide a framework to help ensure that entities consistently and reliably select the project alternative that best meets mission needs. The guidance below is meant as an overview of the key principles that lead to a successful AOA process and not as a "how to" guide with detailed instructions for each best practice identified.

The 22 best practices that GAO identified are grouped into the following five phases:

1. Initialize the AOA process: includes best practices that are applied before starting the process of identifying, analyzing, and selecting alternatives. This includes determining the mission need and functional requirements, developing the study time frame, creating a study plan, and determining who conducts the analysis.
2. Identify alternatives: includes best practices that help ensure the alternatives to be analyzed are sufficient, diverse, and viable.
3. Analyze alternatives: includes best practices that compare the alternatives to be analyzed. The best practices in this category help ensure that the team conducting the analysis uses a standard, quantitative process to assess the alternatives.
4. Document and review the AOA process: includes best practices that would be applied throughout the AOA process, such as documenting

¹The best practices listed in this appendix are an update of, and supersede, the initial set of 24 best practices listed in [GAO-15-37](#).

all steps taken to initialize, identify, and analyze alternatives and to select a preferred alternative in a single document.

5. Select a preferred alternative: includes a best practice that is applied by the decision maker to compare alternatives and to select a preferred alternative.

The five phases address different themes of analysis necessary to complete the AOA process and comprise the beginning of the AOA process (defining the mission needs and functional requirements) through the final step of the AOA process (selecting a preferred alternative).

There are three key entities that are involved in the AOA process: the customer, the decision maker, and the AOA team. The customer refers to the program office, service, or agency that identifies a mission need (e.g. a credible gap between current capabilities and those required to meet the goals articulated in the strategic plan). The decision maker is the person or entity that signs off on the final decision and analysis documented by the AOA report. The decision maker refers to the program manager (or alternate authority figure identified early in the AOA process) who will select the preferred alternative based on the established selection criteria. The AOA team is the group of subject matter experts who are involved in the day-to-day work of the AOA process and work to develop the analysis that is the foundation of the AOA process.

Conforming to the 22 best practices helps ensure that the preferred alternative selected is the one that best meets the agency's mission needs. Not conforming to the best practices may lead to an unreliable AOA, and the customer will not have assurance that the preferred alternative best meets the mission needs. Table 5 shows the 22 best practices and the five phases:

Table 5: Best Practices for the Analysis of Alternatives (AOA) Process

Phase I. Initialize the AOA process
<p>1. Define mission need</p> <p>Definition: The customer defines the mission needs (i.e., a credible gap between current capabilities and those required to meet the goals articulated in the strategic plan) without a predetermined solution. To ensure that the AOA process does not favor one solution over another, the AOA is conducted before design and development of the required capabilities. The customer decides at which level of design completion an AOA should be performed; with the understanding that the more complete the design, the more information is available to support a robust analysis and to select a preferred alternative that best meets the mission need.</p> <p>Effect: Allowing mission needs to be defined in solution-specific terms creates a potential bias and could invalidate the analysis.</p>
<p>2. Define functional requirements</p> <p>Definition: The customer defines functional requirements (i.e. the general parameters that the selected alternative must have to address the mission need) based on the mission need without a predetermined solution. The customer defines the capabilities that the AOA process seeks to refine through characterized gaps between capabilities in the current environment and the capabilities required to meet the stated objectives for the future environment. These functional requirements are realistic, organized, clear, prioritized, and traceable. It is advisable that functional requirements be set early in the AOA process and agreed upon by all stakeholders.</p> <p>Effect: The AOA process is tied to the identified mission needs. Setting functional requirements to a standard other than mission needs allows bias to enter the study because the requirements might then reflect arbitrary measures. Additionally, requirements not tied to mission needs make it difficult to quantify the benefits of each alternative relative to what is required and make it challenging for decision makers to assess which capability gaps will be met for each alternative.</p>
<p>3. Develop AOA time frame</p> <p>Definition: The customer provides the team conducting the analysis enough time to complete the AOA in order to ensure a robust and complete analysis. Since an AOA process requires a large team with many diverse resources and expertise, the process requires sufficient time to be accomplished thoroughly. A detailed schedule is developed prior to starting the AOA process. The duration of the AOA process depends on the number of viable alternatives and availability of the team members. The time frame is tailored for the type of system to be analyzed and ensures that there is adequate time to accomplish all of the AOA process steps robustly.</p> <p>Effect: The AOA process identifies and thoroughly analyzes a comprehensive range of alternatives. Recommending an alternative without adequate time to perform the analysis is a contributing factor to high-dollar acquisitions that have significantly overrun both cost and schedule while falling short of expected performance.</p>
<p>4. Establish AOA team</p> <p>Definition: After the customer establishes the need for the AOA in steps 1 through 3, a diverse AOA team is established to develop the AOA. This team consists of members with a variety of necessary skill sets, specific knowledge, and abilities to successfully execute the study. For example, the AOA team includes individuals with skills and experience in the following areas: program management, federal contracting, cost estimating, risk management, sustainability, scheduling, operations, technology, earned value management, budget analysis, and any other necessary areas of expertise.</p> <p>Effect: An AOA process includes a diverse group of subject matter experts to perform the analysis. Since each subject matter expert brings their knowledge to the team, without the appropriate expertise on the team, errors in the results could occur and gaps in the analysis could be created, causing the AOA's completion to be delayed as more subject matter experts are identified and tasked to work as part of the AOA process.</p>
<p>5. Define selection criteria</p> <p>Definition: The AOA team or the decision maker defines selection criteria based on the mission need. The defined criteria are based on mission needs and are independent of a particular capital asset or technological solution. The selection criteria are defined based on the mission need prior to starting the analysis.</p> <p>Effect: It is essential that the selection criteria be based on the mission needs. If there are no preset criteria based on documented requirements, bias can enter the AOA process and prevent the decision maker from forming an impartial and unbiased decision.</p>

6. Weight selection criteria

Definition: The AOA team or the decision maker weights the selection criteria to reflect the relative importance of each criterion. While the selection criteria are ranked in importance, the alternatives are based on trade-offs between costs, operational effectiveness, risks, schedules, flexibility, and other factors identified by the team or the decision maker.

Effect: An unjustified weighting method can oversimplify the results and potentially mask important information, leading to an uninformed decision.

7. Develop AOA process plan

Definition: The AOA team creates a plan to include proposed methodologies for identifying, analyzing, and selecting alternatives prior to beginning the AOA process. This plan establishes the critical questions to be explored, the selection criteria, the basis of estimates, and measures that are used to rate, rank, and decide among the alternatives. Additionally, the plan includes the criteria used to determine each alternative's viability. A road map and standard work breakdown structure are used to compare the alternatives with the baseline and with each other.

Effect: The functional requirements and selection criteria are identified prior to the beginning of the analysis. If criteria to select the preferred alternative are established after the analysis has begun, bias may influence the study's results. Furthermore, if planned methodologies for the remaining phases of the AOA study are not established, the risk of applying poor methodologies as part of the AOA analysis increases.

Phase II. Identify alternatives

8. Develop list of alternatives

Definition: The AOA team identifies and considers a diverse range of alternatives to meet the mission need. To fully address the capability gaps between the current environment and the stated objectives for the future environment, market surveillance and market research is performed to develop as many alternative solutions as possible for examination. Alternatives are mutually exclusive, that is, the success of one alternative does not rely upon the success of another.

Effect: An AOA process encompasses numerous alternatives in order to ensure that the study provides a broad view of the issue. If the AOA team does not perform thorough research to capture diverse alternatives, the optimal alternative could be overlooked and invalidate the AOA's results and bias the process.

9. Describe alternatives

Definition: The AOA team describes alternatives in sufficient detail to allow for robust analysis. All alternatives' scope is described in terms of functional requirements. This description is detailed enough to support the viability, cost, and benefit/effectiveness analyses.

Effect: Documentation is essential for validating the AOA process and defending its conclusions. Unless the AOA team adequately describes and documents the alternatives, the analysis will not provide sufficient detail to allow for valid cost-benefit estimates and will not be credible.

10. Include baseline alternative

Definition: The AOA team includes one alternative to represent the status quo to provide a basis of comparison among alternatives. It is critical for the AOA team to first understand the status quo, which represents the existing capability's baseline where no action is taken, before comparing alternatives. The baseline is well documented as an alternative in the study and is used to represent the current capabilities and also for explicit comparison later in the study.

Effect: It is essential that the AOA process compare the current environment with the possible future environment. If no status quo is examined, then there is no benchmark for comparison, allowing arbitrary comparisons between alternatives and hindering the credibility of the study.

11. Assess alternatives' viability

Definition: The AOA team screens the list of alternatives to eliminate those alternatives that are not viable, and it documents the reasons for eliminating any alternatives. All alternatives are examined using predetermined qualitative technical and operational factors to determine their viability. Only those alternatives found viable are examined fully in the AOA process. However, all assumptions regarding the alternatives' viable and nonviable status are fully documented, including reasons that an alternative is not viable, in order to justify the recommendation. Additionally, viable alternatives that are not affordable within the projected available budget are dropped from final consideration.

Effect: Not eliminating alternatives based on viability could needlessly extend the study's duration and burden the AOA team or lead to the selection of a technically nonviable alternative. Furthermore, unless the AOA team considers affordability as part of the final recommendation, an alternative that is not feasible based on the current fiscal environment could be selected. Documenting the alternatives that are deemed nonviable is important so that decision makers can clearly see why those alternatives are not considered for further analysis.

Phase III. Analyze alternatives

12. Identify significant risks and mitigation strategies

Definition: The AOA team identifies and documents the significant risks and mitigation strategies for each alternative. Risks are ranked in terms of significance to mission needs and functional requirements. All risks are documented for each alternative along with any overarching or alternative specific mitigation strategies. Schedule risk, cost risk, technical feasibility, risk of technical obsolescence, dependencies between a new project and other projects or systems, procurement and contract risk, and resources risks are examined.

Effect: Since AOA processes typically occur early in the acquisition process, risk is inherently a part of every alternative. Not documenting the risks and related mitigation strategies for each alternative prevents decision makers from performing a meaningful trade-off analysis necessary to choose a recommended alternative.

13. Determine and quantify benefits/effectiveness

Definition: The AOA team uses a standard process to document the benefits and effectiveness of each alternative. The AOA team drafts a metric framework that details the methods used to evaluate and quantify the measures of effectiveness and measures of performance for all mission needs. The AOA team quantifies the benefits and effectiveness of each alternative over the alternative's full life-cycle, if possible. Just as costs cover the entire life-cycle for each alternative, the benefits and effectiveness measures cover each alternative's life-cycle, if possible, in order to determine each alternative's Net Present Value—i.e., the discounted value of expected benefits minus the discounted value of expected costs. In cases where the means to monetize a benefit are too vague (for example, intangibles like scientific knowledge), the AOA team treats those benefits as strategic technical benefits and uses scalability assessments to quantify those benefits so that they are compared across all viable alternatives. In a situation where benefits cannot be quantified, the AOA team explains why this is the case as part of their analysis.

Effect: Determining a standard process to quantify benefits is an essential part of the AOA process. If the AOA team does not clearly establish criteria against which to measure all alternatives, bias is introduced to the study. Additionally, if the AOA team does not examine effectiveness over the entire life-cycle, decision makers cannot see the complete picture and are prevented from making an informed decision.

14. Tie benefits/effectiveness to mission need

Definition: The AOA team explains how each measure of effectiveness supports the mission need. The AOA team shows how the measures of effectiveness describe the way the current environment is expected to evolve to meet the desired environment; the team also shows how the measures are tied to specific mission needs and functional requirements. This is the hierarchy that connects the overarching requirements to the data that are needed.

Effect: Unless the AOA team thoroughly documents how the measures of effectiveness relate to specific mission needs and functional requirements, decision makers will not have proper insight into the impact of each alternative.

15. Develop life-cycle cost estimates

Definition: The AOA team develops a life-cycle cost estimate for each alternative, including all costs from inception of the project through design, development, deployment, operation, maintenance, and disposal. The AOA team includes a cost expert who is responsible for development of a comprehensive, well-documented, accurate, and credible cost estimate for each viable alternative in the study. The life-cycle cost estimate for each alternative follows the GAO 12-step guide and uses a common cost element structure for all alternatives and includes all costs for each alternative.³ Costs that are the same across the alternatives (for example, training costs) are included so that decision makers can compare the total cost rather than just the portion of costs that varies across all viable alternatives. The AOA team expresses the life-cycle cost estimate in present value terms and explains why it chose the specific discount rate used. The AOA team ensures that economic changes, such as inflation and the discount rate, are properly applied, realistically reflected, and documented in the life cycle cost estimate for all alternatives. Furthermore, the present value of the estimate reflects the time value of money; the concept that a dollar today can be invested and earn interest.

Effect: A life-cycle cost estimate that is incomplete (i.e. does not include all phases of an alternative's life-cycle) does not provide an accurate and complete view of the alternatives' costs. Without a full accounting of life-cycle costs, decision makers will not have a complete picture of the costs for each alternative and will have difficulty comparing the alternatives because comparisons may not be based on accurate information. Additionally, applying a discount rate is an important step in cost estimating because all cost data must be expressed in like terms for comparison. Unless the AOA team properly normalizes costs to a common standard, any comparison would not be accurate, and any recommendations resulting from the flawed analysis would be negated. Properly normalizing costs is particularly important if various alternatives have different life-cycles.

16. Include a confidence interval or range for life-cycle cost estimates

Definition: The AOA team presents the life-cycle cost estimate for each alternative with a confidence interval or range, and not solely as a point estimate. To document the level of risk associated with the point estimate for each viable alternative, the confidence interval is included as part of the life-cycle cost estimates for each viable alternative (in accordance with GAO Cost Estimating Best Practice #9, risk and uncertainty analysis).⁵ Decision makers must have access to the confidence interval associated with the point estimates for all viable alternatives in order to make informed decisions. Additionally, the AOA team uses a consistent method of comparing alternatives in order to present a comparable view of the risk associated with each alternative. For example, the comparison can be based on an established dollar value across alternatives (in order to observe the confidence level for each alternative at that dollar value). Alternatively, the comparison can be based on a predetermined confidence level across alternatives (in order to observe the dollar value associated with that confidence level for each alternative).

Effect: For decision makers to make an informed decision, the alternatives' life-cycle cost estimates must reflect the degree of uncertainty. Having a range of costs around a point estimate is useful because it conveys a level of confidence for each alternative to achieve a most likely cost. Without cost risk and uncertainty analysis the life-cycle cost estimates for the viable alternatives are not credible.

17. Perform sensitivity analysis

Definition: The AOA team tests and documents the sensitivity of the cost and benefit and effectiveness estimates for each alternative to risks and changes in key assumptions. Major outcomes and assumptions are varied in order to determine each alternative's sensitivity to changes in key assumptions. This analysis is performed in order to rank the key drivers that could influence the cost and benefit estimates based on how they affect the final results for each alternative. Each alternative includes both a sensitivity and risk and uncertainty analysis that identifies a range of possible costs based on varying key assumptions, parameters, and data inputs. As explained in best practice #16, life-cycle cost estimates are adjusted to account for risk and sensitivity analyses.

Effect: Failing to conduct a sensitivity analysis to identify the uncertainties associated with different assumptions increases the chance the AOA team will recommend an alternative without an understanding of the full impacts on life-cycle costs, which could lead to cost and schedule overruns.

Phase IV. Document and review the AOA process

18. Document AOA process in a single document

Definition: The AOA team documents all steps taken to identify, analyze, and select alternatives in a single document. This document clearly states the preferred alternative and provides the detailed rationale for the recommendation based on analytic results. The report includes sections detailing the steps taken to initialize the AOA process, and to identify, analyze, and select alternatives. For example, one section lists the overall selection criteria and rationale for nonviable or viable ratings for alternatives, assumptions for each alternative, risk drivers and mitigation techniques, analysis of the costs and benefits associated with each alternative, and the trade-offs between costs, benefits, and risks.

Effect: Documentation is essential for validating and defending the AOA process. Without clear reports that compile all information, including standards used to rate and perform the analysis, the study's credibility could suffer because the documentation does not explain the rationale for the methodology or the calculations underlying the analysis. Having all the information related to all best practices of the AOA process in one single document also makes it easier for an independent reviewer to assess the AOA process.

19. Document assumptions and constraints

Definition: The AOA team documents and justifies all assumptions and constraints used in the AOA process. Assumptions and constraints help to scope the AOA. Assumptions are explicit statements used to specify precisely the environment to which the analysis applies, while constraints are requirements or other factors that cannot be changed to achieve a more beneficial approach. Both assumptions and constraints are detailed and justified for each alternative in the AOA plan.

Effect: Without documented and justified assumptions and constraints it will be difficult for decision makers to evaluate the alternatives.

20. Ensure AOA process is impartial

Definition: The AOA team conducts the analysis without a predetermined solution. The AOA process informs the decision-making process rather than reflecting the validation of a predetermined solution. The AOA process is an unbiased inquiry into the costs, benefits, and capabilities of all alternatives.

Effect: An AOA process is not considered valid if it is biased. Performing a study with a predetermined solution distorts the results. The validity of the analysis is affected if bias is introduced to the inputs.

21. Perform independent review

Definition: An entity independent of the AOA process reviews the extent to which all best practices are followed. The AOA process is completed with enough thoroughness to ensure that an independent organization outside of the project's chain of command can review the AOA documentation and clearly understand the process and rationale that led to the selection of the recommended alternative. Part of the documentation includes approval and review from an office outside of the one that asked for or performed the AOA process. For certain projects, in addition to an independent review at the end of the AOA process, additional independent reviews are necessary at earlier stages of the process, such as reviews of the AOA process plan of the identification of viable alternatives. While early reviews are not a substitute for the independent review conducted at the end of the AOA process, they help ensure that bias is not added through the course of the AOA process.

Effect: An independent review is one of the most reliable means to validate an AOA process. Without an independent review, the results are more likely to include organizational bias or lack the thoroughness needed to ensure that a preferred solution is chosen and not a favored solution.

Phase V. Select a preferred alternative

22. Compare Alternatives

Definition: The AOA team or the decision maker compares the alternatives using net present value, if possible, to select a preferred alternative. Net present value can be negative if discounted costs are greater than discounted benefits. Net present value is the standard criteria used when deciding whether an alternative can be justified based on economic principles. In some cases, net present value cannot be used, such as when quantifying benefits is not possible. In these cases, the AOA team documents why net present value cannot be used. Furthermore, if net present value is not used to differentiate among alternatives, the AOA team should document why net present value is not used, and describe the other method that is used to differentiate, and explain why that method has been applied.

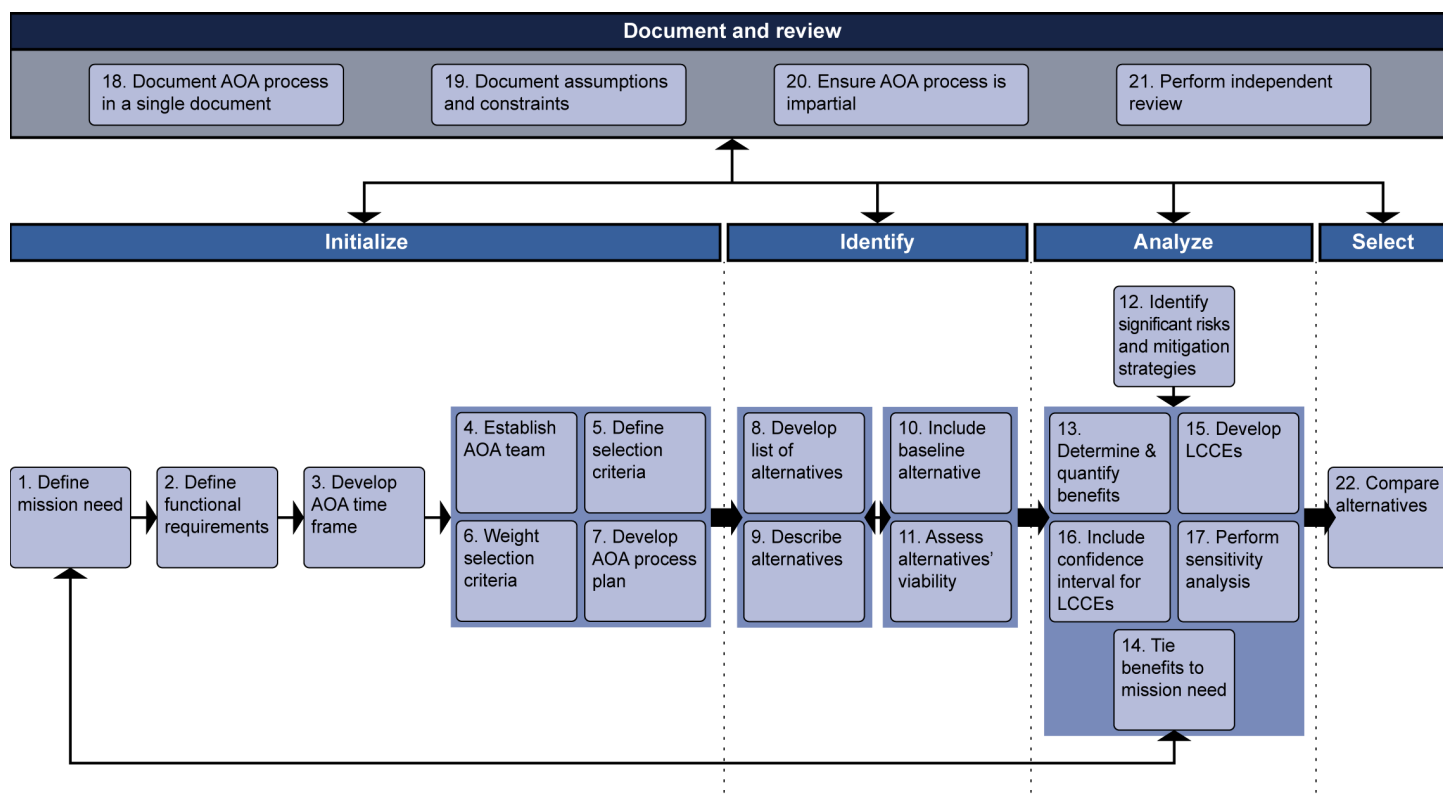
Effect: Comparing items that have not been discounted (or normalized) does not allow for time series comparisons since alternatives may have different life cycles or different costs and benefits.

^aGAO, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, [GAO-09-3SP](#) (Washington, D.C.: Mar. 2, 2009).

^b[GAO-09-3SP](#).

Some best practices included in a phase can take place concurrently and do not have to follow the order presented in table 5. The phases should occur in sequence to prevent bias from entering the analysis and adding risk that the AOA team will analyze alternatives that have not been defined. However, the document and review phase can be done at any stage throughout the AOA process. For example, best practice 5 (define selection criteria) can be done at the same time as best practice 6 (weight selection criteria). On the other hand, best practice 20 (ensure AOA process is impartial) can be done at the end of every step or every phase to ensure the impartiality of the AOA as it progresses. The best practices represent an overall process that results in a reliable AOA that can be easily and clearly traced, replicated, and updated. Figure 3 shows the AOA process and how the steps in each phase are interrelated.

Figure 3: Analysis of Alternatives (AOA) Process Chart



AOA Analysis of alternatives
LCCE Life-cycle cost estimate

Source: GAO. | GAO-16-853

Note: The figure displays the AOA process by phase and step. The “Initialize, Identify, Analyze, and Select” phases should be done in order, but the “Document and Review” phase can be done throughout the AOA process. The arrows indicate that the “Document and Review” phase is related to the other four phases. Within each phase, there are steps that can be done concurrently rather than consecutively. The concurrent steps are grouped together in dark blue boxes. Furthermore, there are steps in later phases that are related to steps in earlier phases; these are connected with a two-way arrow.

Appendix IV: Analysis of Alternatives (AOA) 22 Best Practices and Four Characteristics, With GAO’s Evaluation of the Department of Defense’s (DOD) AOA Process

Above, in our discussion of the extent to which DOD’s AOA process met best practices for such processes, we presented our analysis for certain best practices. In table 6, we summarize our analysis of DOD’s AOA process for the remaining best practices.

Table 6: GAO Analysis of the Department of Defense’s (DOD) Analysis of Alternatives (AOA) Process by Best Practice	
Best practices for the AOA process	Summary of GAO’s analysis
I. Initialize the AOA process	
1. Define mission need Score 5 – Fully Met	DOD’s AOA body of work includes detailed documents that laid out both the shortfalls of current Joint Intelligence Analysis and Production Complex (JIAC) facilities and the specifications for a new JIAC facility, based on the mission needs of the JIAC’s organizations.
2. Define functional requirements Score 5 – Fully Met	The AOA body of work provides the general parameters that the selected alternative must have to address the mission need. For example, in a requirements document, the AOA team discusses how established standards for office space—from Defense Intelligence Agency and Army policy—drive the JIAC facilities’ office space requirements. Also, the AOA body of work defines the gaps between desired capabilities in the current environment. For instance, JIAC consolidation budget justification documents state that intelligence mission growth at RAF Molesworth of over 500 percent since 1991 has resulted in a severe shortfall of intelligence spaces, resulting in intelligence missions being housed in undersized facilities.
3. Develop AOA timeframe Score 3 – Partially Met	During the team’s discussion with DOD officials, they provided dates for several key events during the AOA process and indicated that there was a rough timeline in place that the department needed to follow to meet the dates within the DOD budget process and consolidate as soon as possible, given the degraded JIAC facilities’ condition and impact on missions located at RAF Molesworth. However, the body of work does not provide specific evidence that a timeline for the analysis of alternatives process was established prior to starting the AOA process, which is a requirement of the process.
4. Establish AOA team Score 3 – Partially Met	There is evidence in the AOA body of work that the collection of subject matter experts involved in the AOA process (i.e., the AOA team) consisted of members with certain necessary skill sets, specific knowledge, and abilities to successfully execute the study. For example, the 2011 preliminary AOA summary states that EUCOM, AFRICOM, the Office of the Secretary of Defense, and military service stakeholders worked together to develop a recapitalization plan predicated on a thoughtful, risk-based analysis of alternatives. Given that these DOD organizations are key stakeholders in the operation of the JIAC and execution of its mission, the subject matter expertise of their personnel is relevant to AOA decision making. However, the body of work does not include specific documentation listing the specific subject matter expertise required for the AOA process or the specific experts who provided that expertise during the process. Thus, DOD cannot demonstrate that its AOA team contained all the necessary subject matter experts.
5. Define selection criteria Score 5 – Fully Met	DOD’s AOA body of work provides evidence the department’s AOA team defined the five AOA criteria DOD based on mission needs of the JIAC. For example, the 2011 preliminary AOA summary defines the second criterion—“Impact on Bilateral and Multinational Intelligence Collaboration”—in the context of the JIAC’s mission, explaining that, given the important role collaboration plays in its operations, options were assessed for their potential impacts on international intelligence partnerships.

**Appendix IV: Analysis of Alternatives (AOA) 22
Best Practices and Four Characteristics, With
GAO's Evaluation of the Department of
Defense's (DOD) AOA Process**

Best practices for the AOA process	Summary of GAO's analysis
6. Weight selection criteria Score 3 – Partially Met	In the AOA body of work, the AOA team identifies the first two criteria as critical, which is a form of weighting. Because four of the five AOA criteria used by the team were qualitative—and two criteria are weighted via their label of “critical”—the AOA team partially met the requirements of this best practice. However, DOD provides no indication of the relative weight of the remaining three criteria. This lack of weighting makes it unclear the degree to which the AOA team considered alternatives’ costs and savings in the AOA process.
7. Develop AOA process plan Score 2 – Minimally Met	In the AOA body of work, there is evidence that the AOA team took actions that could reasonably be expected to be part of an AOA process plan. For example, the 2011 preliminary AOA summary generally describes the process followed by the AOA team. However, the body of work does not provide evidence of a process plan of the type required by this best practice. Specifically, there is no evidence that DOD developed a document that establishes the critical questions to be explored; the selection criteria; the basis of estimates; measures that are used to rate, rank, and decide among the alternatives; the criteria used to determine each alternative’s viability; or a road map and standard work breakdown structure used to compare the alternatives with the baseline and with each other.
II. Identify alternatives	
8. Develop list of alternatives Score 4 – Substantially Met	The AOA team identified and considered a wide range of alternatives to meet the mission need. According to DOD officials, the department considered up to 16 alternatives.
9. Describe alternatives Score 2 – Minimally Met	Although the AOA team identified and considered a wide range of alternatives to meet the mission need, DOD’s AOA body of work does not provide evidence that the AOA team met the requirements for describing all of the alternatives. For example, in the 2011 preliminary AOA summary, the AOA team described the alternatives in only basic terms, using several words or one sentence.
10. Include baseline alternative Score 4 – Substantially Met	In the AOA body of work, the AOA team includes one alternative referred to as “Defer capitalization (maintain status quo),” which represents the status quo and provides a basis of comparison among alternatives. This baseline was well documented. For example, DOD 1391 forms—used to provide Congress with information on military construction projects—include information on the current JIAC facilities’ capabilities, explaining that they suffer from a severe shortfall of intelligence spaces. Further, the AOA body of work also included detailed requirements documents that laid out the shortfalls of current JIAC facilities. However, the baseline alternative, like all other alternatives, does not have a full life cycle cost analysis.
11. Assess alternatives’ viability Score 2 – Minimally Met	According to DOD officials, the AOA team determined alternatives’ viability by examining the alternatives using the department’s own five AOA criteria. However, the DOD AOA body of work does not contain documentation indicating that the AOA team met several requirements of our best practice. For example, the body of work does not contain a documented description of the process that the AOA team used to add and remove alternatives over time.
III. Analyze alternatives	
12. Identify significant risks and mitigation strategies Score 3 – Partially Met	DOD’s AOA body of work provides evidence that the AOA team generally identified risks and mitigation strategies, organizing its discussion of risk and mitigation by criterion (as opposed to organizing by alternative). For example, in a 2011 preliminary AOA summary, the team identifies several risks and mitigation strategies for meeting the criterion “Impact on Intelligence Operations.” However, the body of work does not provide evidence that risks are ranked; risks and strategies are documented for each alternative; or that the seven specific types of risks required to be identified by this best practice are discussed.

**Appendix IV: Analysis of Alternatives (AOA) 22
Best Practices and Four Characteristics, With
GAO's Evaluation of the Department of
Defense's (DOD) AOA Process**

Best practices for the AOA process	Summary of GAO's analysis
13. Determine and quantify benefits/effectiveness Score 2 – Minimally Met	The AOA body of work provides some evidence that the AOA team partially met certain requirements for this best practice. Specifically, the team seems to have used a standard process to document the benefits and effectiveness of the alternatives. The 2011 preliminary AOA summary includes a table in which alternatives were assessed and compared using a relative spotlight chart "scoring" construction. However, this table does not include each alternative. Instead, it includes seven individual alternatives, combines three of the German alternative locations into a single entry, and does not include the baseline ("status quo") alternative.
14. Tie benefits/effectiveness to mission need Score 3 – Partially Met	In DOD's AOA body of work, the AOA team provides a general explanation of how mission needs will or will not be met under each of DOD's AOA criteria. However, the AOA body of work does not provide evidence that the AOA team developed specific measures of effectiveness or tied those measures to specific mission needs.
15. Develop life-cycle cost estimates Score 2 – Minimally Met	According to our best practice, the life-cycle cost estimate should include all costs from inception of the effort—in this case, JIAC consolidation—through design, development, construction, operation, maintenance, and disposal. However, the documentation in DOD's AOA body of work does not provide the information required for full life cycle cost estimates. Instead, the AOA team developed partial life cycle cost estimates as part of the AOA process.
16. Include a confidence interval or range for LCCs Score 1 – Not Met	The AOA body of work provides evidence that the AOA team estimated alternatives' costs and savings as point estimates. However, the body of work does not provide evidence that the AOA team calculated a life cycle cost analysis for each alternative with a confidence interval or range. Further, the body of work does not provide evidence that the AOA team used a method of comparing alternatives that presents a comparable view of the risk associated with each alternative.
17. Perform sensitivity analysis Score 3 – Partially Met	Given that four of the five AOA criteria used by DOD in its AOA process were non-quantitative, it may have been difficult for the AOA team to apply sensitivity analysis to these four criteria. However, in regard to DOD's fifth AOA criterion on cost, the AOA body of work does not provide evidence that the AOA team tested or documented the sensitivity of the cost and benefit or effectiveness estimates for each alternative to risks and changes in key assumptions. Further, DOD officials stated that the AOA team did not conduct such an analysis for its cost estimates.
IV. Document and review the AOA process	
18. Document AOA process in a single document Score 2 – Minimally Met	DOD's AOA body of work contains one summary document: the 2011 preliminary AOA summary. However, the 2011 preliminary AOA summary contains neither all of the information in DOD's AOA body of work nor all of the information required by AOA best practices.
19. Document assumptions and constraints Score 3 – Partially Met	The body of work provides evidence that the AOA team considered and documented assumptions and constraints. However, the body of work does not provide evidence that assumptions and constraints are detailed and justified for each alternative in the AOA plan. Instead, they are generally discussed by analysis criterion.
20. Ensure AOA process is impartial Score 4 – Substantially Met	Key documents in the AOA body work provide evidence that the AOA team conducted its analysis without a predetermined solution. While the AOA team developed the recommendation to consolidate the JIAC at RAF Croughton, this recommendation was not—during the AOA process—DOD's final decision.

**Appendix IV: Analysis of Alternatives (AOA) 22
Best Practices and Four Characteristics, With
GAO's Evaluation of the Department of
Defense's (DOD) AOA Process**

Best practices for the AOA process	Summary of GAO's analysis
21. Perform independent review Score 3 – Partially Met	The body of work provides some evidence that DOD's AOA process partially met certain requirements of this best practice. For example, there is evidence that an independent review—such as a review of the AOA process to identify viable alternatives—occurred at an early stage of the process. Also, after the AOA process moved from EUCOM into DOD higher headquarters organizations and review processes (such as the Basing Directorate in the Office of the Secretary of Defense and DOD's programming and budgeting project approval process), DOD entities independent of the core AOA team reviewed analysis and recommendations produced by the core AOA team. However, the body of work does not provide evidence that DOD's AOA process involved an independent review to ensure all best practices were followed or that the AOA process was completed with enough thoroughness to ensure that an independent organization outside of the project's chain of command could review the AOA documentation and clearly understand the process and rationale that led to the selection of the recommended alternative.
V. Select a preferred alternative	
22. Compare Alternatives Score 2 – Minimally Met	DOD's AOA body of work does not provide evidence that the AOA team used net present value—as required by this best practice—to compare alternatives. Instead, DOD's body of work provides evidence that the AOA team used two other methods of comparison—but did not compare all alternatives to each other—and does not explain why the team did not use net present value.

Source: GAO analysis of DOD information. | GAO-16-853

Appendix V: Comments from the Department of Defense

GAO received the Department of Defense's comments on June 6, 2016.



ENERGY,
INSTALLATIONS
AND ENVIRONMENT

Mr. Brian J. Lepore
Defense Capabilities and Management
U.S. Government Accountability Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Mr. Lepore,

(U) This is the Department of Defense response to the GAO draft report, GAO-16-563C, "JOINT INTELLIGENCE ANALYSIS COMPLEX: DOD Did Not Fully Use Best Practices to Analyze Alternatives and Should for Future Military Construction Decisions," dated April 27, 2016 (GAO Code 100388). The Department previously provided technical corrections for this report to your staff during the week of April 18, 2016. While we appreciate a number of findings enumerated in the draft report, the Department disputes GAO's claim that its "22 best practices" are broadly applicable to a wide range of activities that includes military construction, acquisition, or basing and non-concurs with GAO's recommendation that the Department incorporate those practices into its military construction decision-making process.

(U) The Department appreciates GAO documenting the failing condition of facilities at RAF Molesworth, UK that support the critical intelligence activities of the U.S. European and Africa Commands and our allies. The current operation is housed in 21 disparate, undersized, World War II, Cold War-era, and leased temporary facilities that are in poor condition and are at the end of their useful life. Recapitalization is absolutely necessary to ensure US and allied forces intelligence operations are supported by infrastructure that is adequately sized and configured to meet mission requirements. Doing so at RAF Croughton through construction of the Joint Intelligence Analysis Complex (JIAC) makes the most sense both operationally and financially.

(U) The Department also appreciates GAO's assessment that the information from our Analysis of Alternatives (AoA) is "sufficiently reliable for the purpose of describing DoD's rationale for choosing RAF Croughton as the location for JIAC consolidation." Of the 14 locations considered, RAF Croughton rated highest overall against our five evaluation criteria: impact on intelligence operations (critical); impact on bilateral and multinational intelligence collaboration (critical); impact on international agreements and relationships; impact on community quality of life; and business case. Of the alternatives that met the critical operational requirements, RAF Croughton provided the best business case as it is an enduring base whose existing housing, support facilities, available land, and robust communication infrastructure minimized the up-front costs of this project. Consolidating at RAF Croughton enables return to the UK of RAF Molesworth (and the associated support site at RAF Alconbury), resulting in annual savings of \$74 million that will allow the Department to recover its investment in less than four years and, thereafter, enhance readiness by application to other priorities.

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(U) Although the Department also appreciates GAO's finding that in arriving at the decision to recapitalize this critical intelligence facility at RAF Croughton the Department met 21 of the GAO's "22 best practices," the Department takes issue with GAO assessing the JIAC basing decision against criteria published long after the Department's analysis/decision was complete. Furthermore, the Department does not accept GAO's assertion that its "22 best practices" are universally applicable, particularly when considering basing decisions in an operational theater that must take into account a number of subjective factors such as best military judgement.

(U) The Department therefore non-concurs with GAO's recommendation that it develop guidance requiring the use of GAO's "22 best practices" for military construction decisions. As is the case with all of the Department's military construction requests, this project was developed and communicated to the Congress consistent with statute and the Department's long-standing, supporting policies. Specifically, Section 2802(c) of title 10, United States Code, requires the Department's budget submission to include information on "cost-effective practices as an element in the project documents." In support of that requirement the DoD Financial Management Regulation, Volume 2B, Chapter 6, requires inclusion of a DD Form 1391 for each project submitted with the budget request, and that each DD 1391 contain: results of an economic analysis conducted in accordance with DoD Instruction 7041.3, Economic Analysis for Decision-making; information on the current situation (why existing facilities are unsuitable); the requirement (why the project is needed and what alternatives were considered – including use of existing facilities); and the operational impact if the project is not provided.

(U) The Department feels strongly that Section 2802(c) and our long-standing supporting policies provide sufficient information to support military construction decisions, associated requests for authorization/appropriation, and congressional oversight. In cases where the Congress desires additional information on a particular project beyond that which existing statute/policy require, it routinely requests and receives that information through reporting or certification requirements – as was the case with this project in the National Defense Authorization Acts for FYs 14-16. Through this process the Department has addressed all congressional concerns identified to date, as evidenced by congressional authorization and appropriation of two (of three) project phases reviewed thus far.

The Department appreciates the opportunity to comment on the draft report.

Sincerely,



Peter J. Potochney
Performing the Duties of the Assistant Secretary of Defense
(Energy, Installations and Environment)

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Appendix VI: GAO Contact and Staff Acknowledgments

GAO Contact

Brian Lepore, (202) 512-4523 or leporeb@gao.gov

Staff Acknowledgments

In addition to the contact named above, Brian Mazanec, Assistant Director; Jennifer Andreone, Tracy Barnes, Jennifer Echard, Justin Fisher, Georgette Hagans, Jennifer Leotta, Amie Lesser, Anne McDonough, Carol Petersen, Christopher Turner, and Erik Wilkins-McKee made key contributions to this report.

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